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TITLE A COMPENDIUM OF COMPUTER CODES USED IN PARTICLE ACCELERATOR DESIGN
AND ANALYSIS

AUTHOR(S) Los Alamos Accelerator Code Group

SUBMITTED TO Proceedings of the 1987 Accelerator School
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MASTER

Los Alamos National Laboratory

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

A COMPENDIUM OF COMPUTER CODES USED IN PARTICLE ACCELERATOR DESIGN AND ANALYSIS

by the
Los Alamos Accelerator Code Group

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1 INTRODUCTION

Support for this compilation has been provided by the Offices of High Energy and Nuclear Physics, U.S. Department of Energy. We are extremely grateful for their foresightedness.

In searching the accelerator literature, we have come across only two previous comprehensive surveys of useful accelerator codes. The first was a book by John Colonias, "Particle Accelerator Design: Computer Programs," Academic Press (1974). The second was a review article by Bernhard Keil, "Computer Programs in Accelerator Physics," in "Physics of High Energy Particle Accelerators," (SLAC Summer School, 1982) edited by Melvin Month, American Institute of Physics, AIP Conf. Proc. No 105 (1983). Colonias gives a comprehensive discussion of 35 codes. Keil mentions 21 codes. There are only 3 codes that are mentioned in both surveys. This is perhaps an indication of how rapidly codes become obsolete and new codes are written.

In addition to these surveys, there are four other sources worth mentioning.

- 1 "Computing in Accelerator Design and Operation, Proceedings of the 1983 Berlin Conference," Springer-Verlag, Berlin, 1984.
- 2 "Nonlinear Dynamics Aspects of Particle Accelerators, Proceedings of the 1985 Sardinia Conference," Springer-Verlag, Berlin, 1986.
- 3 "Proceedings of the Workshop on Accelerator Orbit and Particle Tracking Programs," Brookhaven National Laboratory Report BNL-31761.
- 4 "Workshop on Orbital Dynamics and Applications to Accelerators," March 7-12, 1985 at Lawrence Berkeley Lab. published in Part. Accel. 19(1986)1-262.

In preparing this compilation, we came across the names of more than 150 programs that have been used in the design and analysis of accelerators. Many are obsolete and some are not easily transported from the institution where they were created. All are included in this compilation and filed at Los Alamos, but the obsolete codes have been removed from this article. Other than the judgement as to whether or not a particular code is obsolete, we have not made any critical evaluations.

Computer codes and code compilations share the common problem of obsolescence. This compilation will probably be almost useless in three years or less. Useful codes become widely distributed. Users make improvements in distributed code, and the original author loses control over the evolution of the code as variations proliferate. Many times authors tire of maintaining, documenting, and distributing their codes. Every generation of accelerator physicists produces code-builders, persons who feel that they can design more comprehensive or easier to use codes to do the tasks done by previous codes.

On the whole this environment of change is healthy, but when the number of codes and the variation on the same code become too large, there is a legitimate

concern about duplication of effort and confusion in comparing the outputs of different codes that supposedly do nearly the same calculations.

It might be useful to establish a mechanism for evaluating and making comparisons between codes. Such a mechanism would also be useful in maintaining and guiding the evolution of codes abandoned by the original authors and in setting standards for types of input, output, and documentation.

The design of the next generation of high energy accelerators will probably be done as an international collaborative effort and it would make sense to establish, either formally or informally, an international center for accelerator codes with branches for maintenance, distribution, and consultation at strategically located accelerator centers around the world.

This arrangement could have at least three beneficial effects. It would cut down duplication of effort, provide long-term support for the best codes, and provide a stimulating atmosphere for the evolution of new codes. It does not take much foresight to see that the natural evolution of accelerator design codes is toward the development of so-called Expert Systems, systems capable of taking design specifications of future accelerators and producing specifications for optimized magnetic transport and acceleration components, making present day programs such as TRANSPORT, POISSON, and SUPERFISH as tools in the optimization process. Such a program would also serve to codify the experience of two generations of accelerator designers before it is lost as these designers reach retirement age.

It is our hope that this compilation will stimulate some thought in this direction. This compilation was assembled by first sending a questionnaire to everyone that we could find who had written a code that might be useful in accelerator design and analysis. About one-third of the questionnaires were returned. We then set about searching the literature for descriptions of the remaining codes. We also telephoned authors when we could not get sufficient information from the literature. Certainly there are useful codes that we did not find. We solicit the readers of this document to write to us about our omissions as well as any errors in content. We are planning to update this document at least once.

This document is organized so that each code is described on a one- or two-page data sheet. The data sheets are arranged alphabetically by code name but are not numbered. In this way, it will be easy to insert new codes as they are discovered. There are a number of simulation codes that have no names, and we have not taken the time to obtain detailed information on all of them. However, there are two fairly current codes that we thought worthwhile to include here. Therefore we have arbitrarily assigned them names. One of these is a CERN code by Myers, which we have called BEAMBEAM and the other is a DESY code by Piwinski, which we have called BMBMI.

The code data sheets are preceded by three indexes: 1- subject, 2- person to contact, and 3- code acronym. It was not useful to list codes by authors because, in many cases, the original author is no longer associated with the code and many other persons have contributed to maintaining and improving the code.

We would like to thank those who replied to our request for information. Special thanks goes to Roger Peng, who did most of the organization and typing, and to Gary Benson, who wrote the TeX-formatting macro for the data sheets.

It is our sincere hope that this document will be helpful to persons entering the accelerator field. It has certainly been a revelation to us.

Before closing this introduction, I would like to bring up a very important point. This compilation is continuously updated by the Los Alamos Accelerator Code Group. If you know of computer codes for particle accelerator design and analysis which are not included in the compilation here, please inform us by sending the name of the code, a brief description, and an address for further contact. Your effort will help in creating a more comprehensive compilation and will be appreciated by the accelerator community. A copy of this compendium and further updates are also available from us. Our address is

Los Alamos Accelerator Code Group
AT-6, Mail Stop H 829
Los Alamos National Laboratory
Los Alamos, NM 87545

Telephone: (505)667-2839 or
FTS 843 2839

2 SUBJECT INDEX

ANALYSIS-Impedances

KNIC

MAFIA

ANALYSIS-MISALIGNMENTS ORBIT CORRECTIONS

ALIGN

ODINV

MICADO

PETROC

PETROS

ANALYSIS-Space Charge Effects

KOBRA

ZFIELD

ANALYSIS-Spin Depolarization

SLIM

ANALYSIS-Stability

AZTEC

BBI

MARYLIE

MAFIA

PETROS

SLIM

SCHAR

SYNCH

TRANSVRS

ZAP

ANALYSIS-Wakefield Effects

BCI

MAFIA

SIMTRAC

TBCI

TRANSVRS

ANALYSIS-Other

BIM2D (General magnetic field calculations in 2D)

CARMEN (General magnetic field calculations in 3D)

EBQ (Particle Distributions)

SLIM (Depolarization of Electron Beams)

ZAP (Intrabeam Scatter, Gas Scatter, Touschek Effect)

COMPONENTS-Ion Sources, Electron Guns

AXCEL-GSI

BEAM

CARMEN

EBQ

EGUN

KOBRA

MASK

RAY

SCHAR

SNOW

MAFIA

SOLE

COMPONENTS-MASTER

TARMEN
 DEED
 DIFDIRA
 EDDYNET
 EFFI 3D
 EMD
 FATIMA
 FORGY (See TRIM)
 GFUN3D
 LINDA
 MADEST
 MAFCO
 MAFCO-W
 MAGFOR
 MAGNET
 MAGNUS
 PANFIRA GROUP CODES
 PAR2DOPT
 PL2D
 POISCR
 POISSON GROUP CODES
 POISSON-BNL
 POISSON-LBL
 POISSON-TAC
 PROFI
 SATDSK
 TOSCA
 TRIDIF
 TRIM(ANL)

COMPONENTS-RF Cavities

AZTEC
 BCI
 CAV3D
 CAVIT
 CURE
 DISPER
 DISPERSION
 HAX
 H2DB
 LACC
 LALA
 LALAGE
 LANS
 LILA
 LOOPER
 MAFIA
 MESSYMESH
 MULTIMODE
 SCAR2D
 PISCES
 PRUD-M
 PRUD-O
 PRUD-OB
 SHRIMP
 SUPERFISH GROUP CODES
 TACI
 TRANSVRG
 ULTRAFISH
 URMEL
 URMEL-T

COMPONENTS-Linear

JASON Electrostatics

RELAX-3D 3D Electrostatics

RMKT Klystron

OPTIMIZATION-Cyclotrons

BEAMTRACE

COSY 5.0

GIOS

GOBLIN

SATDSK

SINAC

TRAJECTORY

OPTIMIZATION-LINACS

EBQ

HOP1

PARMILA

PARMTEQ

SCHAR

TRACE

TRACE3D

OPTIMIZATION-Spectrometers/Transport lines

BEAMTRACE

DIMAD

GIOS

HARMON

MAPPOT

MARYLIE

MIRKO

MOTER

PARMILA

PATH

PATRICIA

PINWHEEL

RAY

SYNCH

TRAMP

TRANCO

TRANSOPT

TRANSPORT

TRANSPORT LBL

OPTIMIZATION-Synchrotrons

AGS

BEAMTRACE

COSY 5.0

DIMAD

GIOS

HARMON

LATTICE

MAD

MARYLIE

MIRKO

PAQUASEX

PATHTRACK

RING

SYNCH

TEAPOT

WIGWAM

OPTIMIZATION-Tools:

BEAMTRACE

COSY 5.0 (Optical Systems)

COMFORT (Insertion lines and circular machines)

DIMAD (Storage Rings)

MARYLIE (Beam Lines and Storage Rings)

OPTIC II (Electrostatic Accelerators)

SIMULATION TRACKING-Colliding Beams

BEAMBEAM)

BMBMI)

SYMP3

SIMULATION TRACKING-Cyclotrons

BEAMTRACE

COSY 5.0

GIOS

NAJO

PINWHEEL

SINAC

TRAJECTORY

SIMULATION/TRACKING-LINACS

BEDLAM

CCRTRACE

DECAY-TURTLE

EBQ

GENMAP 3.0

GIANT

LTRACK

MAFCO III

MOTION

PARMELA (Electron)

PARMILA (Ion)

PARMTEQ (RFQ)

RAYTRACE

RFQLIB

SCHAR

SCOP-2

SCOP-RZ

TRACE3D

ZFIELD

SIMULATION/TRACKING-Synchrotrons

ARCHSIM

COSY 5.0

DECAY-TURTLE

DIMAD

EVOL

GENMAP 3.0

GIOS

LATTICE

LIEPOT

LILA

LIMATRA

MAFCO III

MARYLIE

MAIRACE

MIRKO

PAIPET

PATRAC

PAIRLINA

PATTY

PETROCC

PETROS
 RACETRACK
 RING
 SCOP-2
 SCOP-RZ
 SIMTRAC
 SLIM
 SYNCH
 TEAPOT
 SIMULATION TRACKING-Spectrometers
 BEAMTRACE
 PINWHEEL
 TRACK
 SIMULATION TRACKING-Storage Rings
 DIMAD
 LATTICE
 MARYLIE
 SCOP-2
 SCOP-RZ
 SYNCH
 SIMULATION/TRACKING-Transport and Beam Lines
 MARYLIE
 MOTION
 REVMOC
 SPEAM VI
 TRAMP
 TRANCO
 TRANSPORT
 TRANSPORT_LBL
 TRIO
 TURTLE
 SIMULATION/TRACKING-Other
 COSY 5.0 (General Optics)
 GOC3D (General Magnetic Field)
 KOBRA (Space Charge Effects)
 MAFCO III (General Field Configurations)
 MISAR (Intense Beam Accumulator Rings)
 OPTIC II (Electrostatic Accelerators)
 SINAC (General Magnets)
 SOTRM (Generate Transport Matrices from Magnetic Field)
 OTHER APPLICATIONS-
 COMFORT (Control Program)
 GIANT (Control Program)
 GO (Executive Program)
 GRAPHIC (Executive Program)
 HETC (Target and Shielding Design)
 HOPI (Control)
 ISIS (Modeling of Intense Charged Particle Beams)
 ITS (Charged Particle Transport Code)
 MARTUR (Radiation Loading Calculation)
 MEBT (Beam Diagnostics)
 SOTRM (Generate Transport Matrices from Magnetic Field)
 TRANCO (Control)
 WAVE (Laser Beat Wave Acceleration)
 WISWAM (Electron Storage Ring and Wiggler Performance)

3. LIST OF CODES

AGS	KOBRA	PETROS	STRANSOPTR
ALIGN	LACC	PE2D	TRANSPORT
ARCHSIM	LALAGE	PINWHEEL	TRANSPORT-LBL
AXCEL-GSI	LANC	PISCES	TRANSVRS
AZTEC	LATTICE	POISCR	TRIDIF
BBI	LIEPOT	POISSON GROUP	TRIM (ANL) &
BEAM	LIMATRA	CODES	FORGY
(BEAMBEAM)	LINDA	POISSON-BNL	TRIO
BEAMTRACE	LOOPER	POISSON-LRL	TURTLE
BEDLAM	LTRACK	POISSON-TAC	ULTRAFISH
BIM2D	MAD	PROFI	URMEL
(BM8MI)	MADEST	PRUD-M	URMEL-T
CARMEN	MAFCO	PRUD-O	WAVE
CAV3D & CAVIT	MAFCO III	PRUD-OB	WIGWAM
CCRTRACE	MAFCO-W	RACETRACK	WOLF
CODINV	MAFIA	RAY	ZAP
COMFORT	MAGFOR	RAYTRACE	ZFIELD
COSY 5.0	MAGNET	RELAX3D	
DECAY-TURTLE	MAGNUS	REVMOC	
DE2D	MAPPOT	RFQLIB	
DIFDIRA	MARTUR	RING	
DIMAD	MARYLIE	RMKT	
DISPERSION	MASK	SATDSK	
EBQ	MATRACE	SCHAR	
EDDYNET	MEBT	SCOP-2	
EFFI(3D)	MICADO	SCOP-RZ	
EGUN	MIRKO	SHRIMP	
EMD	MISAR	SIMTRAC	
EVOL	MOTER	SINAC	
FATIMA	MOTION	SLIM	
FORGY	MULTIMODE	SNOW	
GENMAP 3.0	NAJO	SOTRM	
GIANT	OPTIC II	SPEAM VI	
GLOS	OSCAR2D	SUPERFISH GROUP	
GO	PANDIRA	CODES	
GOBLIN	PAQUASEX	SYMP3	
GOC3D	PAR2DOPT	SYNCH	
HARMON	PARMELA	TBCI	
HAX	PARMILA	TEAPOT	
H2DB	PARMTEQ	TOSCA	
HETC	PATH	TRACE	
HOPI	PATPET	TRACE3D	
ISIS	PATRAC	TRACK	
ITC	PATRICIA	TRAJECTORY	
JASON	PATTV	TRAMP	
KN7C	PETROC	TRANCO	

Date of Latest Version: unknown

Program Name: AGS

Person to Contact: E. Keil

Address: LEP Division

CERN

1211 Geneva 23

Suisse, Switzerland

Telephone Number:

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☐ RF-cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☒ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

Program AGS computes the transformation matrices of the elements that make up the synchrotron, computes the betatron and closed orbit functions, the coordinates of the equilibrium orbit, and other pertinent quantities. A typical run is completed in less than one minute. Memory requirements depend on the number of elements that the program can handle. For maximum efficiency the program is overlaid and more than 1500 elements can be accommodated in less than 50K_a memory locations. Program AGS is, in many respects, similar to program SYNCH.

Publications describing the code:

E. Keil, Y. Marti, B. W. Montague and A. Sudboe, "AGS - The ISR Computer Program for Synchrotron Design, Orbit Analysis and Function Matching" CERN Internal Report CERN 75-13(1975)

Is code documentation available? ☐ Yes ☒ No

How may the code be obtained?

No longer supported by the authors

Source language: FORTRAN

Computers it runs on: CDC 6600

It is available as: ☐ Source code, ☐ Executable only

Source Media: ☐ Listing, ☐ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format:

Diskette size & format:

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address: keil@cern.ch

Date of Latest Version: unknown

Program Name: ALIGN

Person to Contact: Elon R. Close MS-50B 2230

Address: Lawrence Berkeley Laboratory

1 Cyclotron Rd.

Berkeley, CA 94720

USA

Telephone Number: (415) 486-6166, FTS 451-6166

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☒ Closed Orbit Correction.

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

This code simulates survey misalignments of magnetic elements in a circular accelerator. It constructs a closed orbit corresponding to the misalignment errors and finds corrector strengths needed to sustain particle beam within the vacuum chamber. This is a Monte Carlo type program that performs a collection of misalignments over an ensemble of machines. ALIGN was developed and used for the construction of PEP, has been exported to CERN where it was used in the design of LEP.

Publications describing the code:

E. R. Close, et al, "Proposed Orbit and Vertical Dispersion Correction System for PEP," Stanford Linear Accelerator internal report PEP Note 271 and CONF 7903271-151 (1979).

Is code documentation available? ☐ Yes ☒ No

How may the code be obtained:

Call Elon R. Close

Source language: FORTRAN

Computers it runs on: CDC

It is available as: ☐ Source code, ☐ Executable only

Source Media: ☐ Listing, ☐ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format:

Diskette size & format:

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address:

Date of Latest Version: July 1986

Program Name: ARCHSIM

Person to Contact: Henry A. Thiessen
Address: MP-14, MS H847
Los Alamos National Lab.,
Los Alamos, NM 87545
USA

Telephone Number: (505)667-8991, FTS 843-8991

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☐ RF-cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☒ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

ARCHSIM simulates the acceleration cycle of a rapid-cycling proton synchrotron. A lattice can consist of up to 100 cells and rf cavities. Transport of the beam in six dimensions includes all second-order optical terms. The rf field and proton velocity are treated exactly. Longitudinal space charge is handled in a self-consistent manner. The fluctuations due to the finite number of particles are handled by a Gaussian smoothing algorithm. The program runs on a VAX 11/780 and can track 100 particles without space charge through the full acceleration cycle from 0.8 to 32 GeV in 49 minutes (1000 turns). A thousand particles with space charge takes about ten hours of computer time.

The motivation for writing this tracking program was the need to explore the effect of various rf accelerator cavity parameters on the beam dynamics and stability of a proposed 32 GeV rapid cycling synchrotron.

Currently the program is under revision to improve the graphics (phase space plots and particle distribution histograms) and the number and type of optical elements available. The program uses second order transport matrices generated by another program like DIMAT. These matrices are checked to see if they are symplectic before doing the simulation.

Publications describing the code:

Henry A. Thiessen and John L. Warren, 'ARCHSIM: A Proton Synchrotron Tracking Program including Longitudinal Space Charge,' Computing in Accelerator Design and Operation, Proc. 1984, Vol. 1, CERN, Verlag Bern (1984), 27-39.

Is code documentation available? ☐ Yes, ☒ No

How may the code be obtained?

Contact: H. A. Thiessen

Source Language: FORTRAN 77

Computer(s) it runs on: VAX 11/780

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☐ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☒ Networks

Tape format: ☒ Track 1600 bpi

Diskette size & format:

Available through: ☐ DECNET, ☒ ARPANET, ☒ BITNET
☐

Network Address: hks@lanl.arpa

Date of Latest Version: 1986

Program Name: 3000

Person to Contact: Peter Spadtke

Address: GSI Darmstadt
Postfach 11-01 41
6100 Darmstadt
Fed. Rep. Germany

Telephone Number: 011-49-6231

Classification of Computer Code:

Component Design:

☒ Ion Source, ☐ Magnet, ☐ RF cavity, ☒ Electron Gun/DC Beam Transport

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron,

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron,

Analysis:

☐ Stability, ☐ Impedances,

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

2D code: cylinder symmetry, plasma boundary, electrons and ions, cathode simulation, plasma simulation, including symmetric magnetic fields; Interactive code: Diagnostic, trajectories, emittances, transverse energies

Publications describing the code:

Peter Spadtke, "Computer Simulation of High Current DC Ion Beams," Proc. 1984 Linac Accelerator Conf., Seebach May 7-11, 1984, GSI Darmstadt internal report GSI 84-11

J. H. Ebner, P. Spadtke, and A. Schenk, "High Current Beam Transport Experiments At GSI-111," Trans. Vol. 32 (1985) 2462

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

Contact Peter Spadtke

Source: (in tape, 2, 3, 4, 5, 6, 7)

Code cat. no.: (runs on: IBM, VAX)

Does it require a) ☒ source code ☐ executable only

source: (library) ☐ in tape ☐ tape ☐ Diskette ☐ Card ☐ Network

Input/output:

☐ Diskette ☐ card ☐ console

Are we due through: ☐ DECNET ☐ ARPANET ☐ BITNET

Network Address: (if applicable) 13.106.0

Date of Latest Revision: 10/1/84

Program Name:

Person to Contact: Mine-Maria Gygis-Hubner
Address: CERN
CH-1211 Geneva 23
Switzerland

Telephone Number: 83 2071 83 6637

Classification of Computer Code:

Component Design:

Ion Source, Magnet, RF cavity,

Accelerator Optimization

Linac, Cyclotron, Synchrotron,

Tracking or Simulation

Linac, Cyclotron, Synchrotron,

Analysis:

X Stability, Impedances,

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

Calculation of bunched beam instabilities

Longitudinal-transverse coupled bunch modes

Bunch lengthening-transverse mode coupling

Energy shifts, intra-beam scattering etc.

Publications describing the code:

Internal CERN Report: CERN Theory Note 83-1

Albert Hofmann, Kurt Hubner and Bruno Zotter: "A Computer Code For The Calculation Of Beam
Stability in Circular Electron Machines" IEEE Trans. Nucl. Sci. NS-30 (1983) 3-11

Is code documentation available? X Yes No

How can the code be obtained?

Source language: FORTRAN

Operating system: Unix on a Cray

Does it require X source code Executable only

Input device: Keyboard, Tape Diskette Card punched card

Time to input:

Time to output: 10-15 min

Accession through: DOE/SLAC ARPA/SLAC BNL/SLAC

Other: no Agency

Date of Latest Version: Jan 1985

Program Name: 000001

Person to Contact: Murray Shubaly

Address: Group AF-1, MS H817
Los Alamos National Laboratory
Los Alamos, NM 87545
USA

Telephone Number: (505) 667-9124, FTS 813-9124

Classification of Computer Code:

Component Design:

☒ Ion Source, ☐ Magnet, ☐ RF cavity, ☐ Other

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐ Other

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐ Other

Analysis:

☐ Stability, ☐ Impedances,

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

BEAM (Beam Extraction and Acceleration Modeling) is a second generation 2D ion source code based on AXCEL with some features from SNOW. It has the following capabilities: Starting from the unperturbed plasma, the code calculates ion trajectories and electrostatic potentials, the electrode boundaries need not coincide with mesh lines, the mesh density is variable to permit finer resolution in critical regions. Both extraction and injection calculations are possible, with variable current density in the source plasma, variable ion injection energy and angle, and finite ion temperature effects. Space charge neutralization is included. The output of the code gives values of rms emittance, divergence, and radius, maximum divergence and radius, and overlaid equipotential and trajectory plots. Both rectangular and cylindrical geometry are treated. It does not at present handle axial magnetic fields, but this improvement is planned in the near future. Only partially complete documentation is available, but the coding is well commented.

Publications describing the code:

M. R. Shubaly, R. A. Todd and R. W. Hannum, "BEAM: An Improved Beam Extraction and Acceleration Modeling Code," IEEE Trans. NS 28 (1981) 2655.

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

Call Murray Shubaly or The Los Alamos Accelerator Code Group (505) 667-6677 or 667-9849

source language: FORTRAN IV

Computer: it runs on CDC 6600, CYBER 170, VAX, IBM

It is available as: ☒ Source code, ☐ Executable only

source Media: ☐ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☒ Network

Tape format: 1600 bpi, 9 track

Diskette: use 2 format

Available through: ☐ DECNET, ☐ ARPANET, ☒ BITNET

Network Address: lks@lanl.upa

Date of Latest Version: unknown

Program Name: BEAMBEAM

Person to Contact: Steve Myers
Address: CERN
LEP Division
1211 Geneva 23
Switzerland

Telephone Number:

Classification of Computer Code:

Component Design:

Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

Linac, ☐ Cyclotron, ☐ Synchrotron, ☒ Colliding Beams

Analysis:

Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

A multi-particle two-beam (strong-strong) simulation program has been written for investigation of the beam-beam effect in LEP. The motion of the superparticles is treated in six-dimensional phase space and the effects of quantum excitation and radiation damping are included. The effects of perturbations to the superperiodicity (errors) are also included. Non-zero dispersion at the RF cavities allows computation of single-beam synchro-betatron resonances.

After each revolution the parameters influencing the beam-beam force (e.g. the beam dimensions and the beam current) are reevaluated in order to simulate a real situation. For the beam-beam force an elliptical beam with Gaussian charge distribution has been assumed. The computation of this force is speeded up by using tabulated values of the complex error function and a fast interpolation procedure.

The initial distribution of a large number of particles (typically 2000) in the three phase planes are random with pre-specified variances. Each particle in each beam is 'tracked' through (i) an RF cavity, (ii) a beam-beam interaction and (iii) a traversal of a machine arc. This procedure is repeated until each beam has completed one run. The position of each particle is then compared with aperture limitations (typically 10 cm) and those particles which fall outside are excluded from further tracking. The remaining particles are then used to recalculate the beam current, the specific luminosity, the beam variances and hence the new beam-beam kick parameters. This cycle is repeated until the beam has been circulating for about 15 damping times.

Publications describing the code:

Myers, "Beam-Beam simulation for LEP", IEEE Trans. Nucl. Sci. 28 (1981) 503. See also IEEE Trans. Nucl. Sci. 28 (1981) 2106 and Nucl. Instr. Meth. 211 (1983) 263.

Is code documentation available? ☐ Yes ☐ No

How may the code be obtained?

unknown

Date of Latest Version: 1987

Program Name: GIOS Beam Trace

Person to Contact: M. Berz or H. Wollnik
Address: FI-Physikal Institut
Heinrich Buffring 14-16
D-6900 Caessen,
Fed. Rep. Germany

Telephone Number: 49-792-2770

Classification of Computer Code:

Component Design:

Ion Source, ☐ Magnet, ☐ RF cavity,

Accelerator Optimization:

☐ Linac, ☒ Cyclotron, ☒ Synchrotron, ☒ magnetic optical system

Tracking or Simulation:

☐ Linac, ☒ Cyclotron, ☐ Synchrotron, ☒ mass spectrometers

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

PO code, usual beam elements, space charge, transport beam by 2nd order matrices

Publications describing the code:

H. Wollnik, J. Brezina and M. Berz, "GIOS Beam Trace, a program for the design of high resolution mass spectrometer", 2nd Intl. Conf. on Charg. Particle Optics, Albuquerque, May 19-23, 1986 (CERN published in Nucl. Inst. Meth.)

GSI report FHD-26, Darmstadt (1984)

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

Source Language: FORTRAN

Computer: runs on VAX, Cyber

Program available as: ☒ Source code, ☐ Executable only

Source of tape: ☐ Existing, ☒ Tape ☐ Diskette, ☐ Cards, ☒ Network

Tape format: as desired

Diskette or c.c. format: as desired

Available through: ☐ DECNET, ☐ ARPANET, ☒ BITNET

Network Address: wgt1@bigrednet

Date of Latest Version: Aug. 1985

Program Name: BEDLAM

Person to Contact: Walter P. Lysenko
Address: Group A1-6, MS H920
Los Alamos National Laboratory
Los Alamos, NM 87545

Telephone Number: (505) 667-7431 EFS 843-7430

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron,

Tracking or Simulation:

☒ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

BEDLAM is a fourth-order moment simulation code. The beam at the input to a linear accelerator is specified as a collection of moments of the phase space distribution. Then the moment equations, which describe the time evolution of the moments, are numerically integrated. No particles are traced in this approach. The computed distribution and the external forces are computed consistently to a given order of accuracy. Although BEDLAM includes moments to fourth order only, it could be systematically extended to any order. Another feature of this method is that physically interesting and intuitive quantities, such as beam sizes and rms emittances, are computed directly. This code is still under development to include space charge effects.

Publications describing the code:

P. L. Channell, E. M. Healy and W. P. Lysenko, "The Moment Code BEDLAM," IEEE Trans. NS-32 (1985) 2565.

Is code documentation available? ☐ Yes ☒ No

How may the code be obtained?

Los Alamos Accelerator Code Group, (505) 667-6677 or 667-2839

Source language: FORTRAN

Computer: Cray on CRAY-3E

Documentation: ☒ Source code, ☐ Executable only

Source Media: ☐ Card, ☒ Tape, ☐ Diskette, ☐ Cards, ☒ Network,

☐ Tape for automatic

☐ Diskette for 5 format

Available through: ☐ DEUNET ☒ ARPANET ☒ BITNET

Internet Address: wplysen@lax

Date of Latest Version: Dec 1984

Program Name: BM2D

Person to Contact: John S. Whitney
Address: Vector Fields Ltd
Osney Mead
Oxford OX2 0EE
England

Telephone Number: 0865 219236

Classification of Computer Code:

Component Design:

Ion Source, ☒ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

Stability, ☐ Impedances ☐ $\vec{E}$ General purpose magnetic field calculation in 2D

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

BM2D is an interactive computer program for solving linear magnetostatic problems using boundary integral methods.

The computer model assumes that the magnet can be represented by a two-dimensional (x-y) cross-section of iron and conductor regions. The permeability in each iron region and the current density in each conductor region are specified constants which can be changed between repeated analyses. The limitation to fixed permeability allows an integral formulation where only the edges of the iron cross-section need to be meshed; the analysis is performed very quickly on-line so that the system is truly interactive.

Input to the program is via a graphics terminal and is completely interactive. As the magnet data are input, the model is displayed on the terminal screen. Any errors can be seen and corrected immediately.

Magnetic fields can be calculated at points, along a line or over a grid, displayed as contour maps or graphs and consequent forces can be obtained. Listings, graphs and plots are available as output.

Publications describing the code:

Patent ed Report RL 79-088(1979)

Comp. Soc. Ref. 928631

Is code documentation available? ☒ Yes ☐ No

How can the code be obtained?

By licence agreement with Vector Fields Ltd

Source Language: FORTRAN 77

Computer it runs on: PRIME 3XX

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☐ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format: As required

Diskette size & format:

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address:

Date of Latest Version: unknown

Program Name: (BM300)

Person to Contact: A. Piwinski

Address: DESY

Notkestr. 85

2000 Hamburg 52

Fed. Rep. Germany

Telephone Number:

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☐ RF-cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☒ Colliding Beams

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

The beam-beam interaction was simulated on a digital computer taking into account the horizontal and vertical betatron oscillation, the synchrotron oscillation, a horizontal dispersion at the interaction point, quantum fluctuation, damping and the exponential decay of the voltage at the separators. The space charge forces were derived from the exact potential of a time-independent gaussian bunch, were calculated for 10000 points and then quadratically interpolated for each passage. The simulation was done for 225 particles starting with a gaussian distribution. The beam height and the beam width were calculated as the root mean square of the coordinates of the particles at the interaction point during 20 revolutions. The collision of two strong bunches was also simulated.

Publications describing the code:

A. Piwinski, "Computer Simulation of the Beam-Beam Interaction," 11th Int'l Conf. on High Energy Accelerators, Geneva, July 7-11, 1980, **Birkhauser Verlag, Basel.**

A. Piwinski, "Computer Simulation of the Beam-Beam Interaction at a Crossing Angle," **IEEE Trans NS-32** (1985) 2240

Is code documentation available? ☐ Yes ☐ No

How may the code be obtained?

unknown

Source language:

Computers it runs on:

It is available as: ☐ Source code, ☐ Executable only

Source Media: ☐ Listing, ☐ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

☐ Tape format

☐ Diskette size & format

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address:

Date of Latest Version: Version 1.0, 1986

Program Name: CARMEN

Person to Contact: John S. Whitney
Address: Vector Fields Ltd
Osney Mead
Oxford OX2 0EE
England

Telephone Number: 0865 248236

Classification of Computer Code:

Component Design:

☒ Ion Source, ☒ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☒ General purpose magnetic field, trajectory and eddy current in 3D

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

CARMEN is an advanced program for the calculation of eddy currents in three dimensions. The algorithm used in CARMEN gives nearly optimal economy for magnetic field computation and it is implemented using state-of-the-art numerical methods. In addition to magnetic fields the program can also be used to model any system governed by Poisson's equation. This includes electrostatics and current flow.

Applications include fusion magnets, particle accelerators, MRI gradient field eddy currents, nondestructive testing, electrical machines, eddy current heating, electron lenses and deflection magnets.

CARMEN uses a discrete finite element model in order to solve the partial differential equations governing the behavior of a system.

The mesh is formed from hexahedra with ruled faces which are automatically subdivided into elements. A 2D grid is created initially and this can then be swept through space thus creating 3D volumes. The sweep operations include translation, rotation and projection.

The mesh primitive blocks are assigned material names and geometric properties, for example orientation.

CARMEN uses 8 and 20 node isoparametric brick elements. These can be mixed together, the program will enforce inter-element continuity. The type of element created in each primitive may be selected by the user. This allows the higher order elements to be used where solution accuracy is important. Two result evaluation modes are provided to give a choice between speed and accuracy.

The suite of programs was designed to be used in a distributed computing environment. Data files created for CARMEN can be easily transferred between computers and result files from CARMEN can be returned. CARMEN provides full check point, dump file and restart facilities to maximize the efficient use of computer resources. The PC CARMEN program allows results to be displayed graphically and further calculations can be performed e.g. particle trajectories.

Publications describing the code:

CRI Emsen, J. Spink and CW Frowbridge, 'Further Developments in Three Dimensional Eddy Current Analysis' IEEE Trans. MAG-21(1985) 2231

Data sheet Ref: 028671 From Vector Fields.

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

By licence agreement with Vector Fields, Ltd.

Source language: FORTRAN 77

Computers it runs on: PRIME, VAX IBM

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☐ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format: As required

Diskette size & format:

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address:

Date of Latest Version: Apr 1985

Program Name: CAV3D.CAV

Person to Contact: Dr. Wolfgang Wilhelm
Address: Physik Department E12
Technische Universität München
Fed. Rep. Germany

Telephone Number: +89 4207 2435

Classification of Computer Code:

Component Design:

Ion Source, ☐ Magnet, ☒ RF cavity, ☐

Accelerator Optimization:

Linac, ☐ Cyclotron, ☐ Synchrotron,

Tracking or Simulation:

Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

CAVET is a 2D code for cavities with constant cross-section, the calculation is performed in a square mesh, accuracy is better than 1 percent

CAV3D calculates low frequency modes of any cavity with a 3D cubic mesh, and accuracy of about 5 percent

Publications describing the code:

W. Wilhelm: Particle Accelerators 12 (1984) 119

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

From the author

Source language: FORTRAN

Computer it runs on: Cyber DEC 10

Is it available as: ☒ source code, ☐ Executable only

Source Media: ☐ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format:

Diskette size & format:

Available through: ☐ DCCNFEL ☐ ARPANET ☐ BITNET

Network Address:

Date of Latest Version: Dec 1985

Program Name: CCRTTRACE

Person to Contact: Roger Cole MS-810
Address: MS-810, Group MP-1
Los Alamos National Laboratory
Los Alamos, NM 87545
USA

Telephone Number: (505) 667-7193, FTS 843-7193

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☒ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

CCRTTRACE is a first order envelope tracing code, currently for transverse effects only. The "guts" of CCRTTRACE is a subroutine library with powerful, simple interface. The operator interface runs on color CRT in CCR or on V1640. It ~~was~~ designed for use on the Los Alamos Meson Physics Facility (LAMPF) accelerator.

Publications describing the code:

MP-1-1563-2 (LA Los Alamos National Laboratory internal report)

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

☒ Not readily available

Source language: FLECS

Computers it runs on: VAX/VMS

It is available as ☐ Source code, ☐ Executable only

Source Media: ☐ Listing, ☐ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

☐ Tape format

☐ Diskette size & format

Available through ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address:

Date of Latest Version: July 1985

Program Name: CODIN

Person to Contact: John E. Warren

Address: Group A1-6, MS H-829
Los Alamos National Lab
Los Alamos, NM 87545
USA

Telephone Number: (505) 667-6677, FTS 843-6677

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐ Closed Orbit Distortion Corrections

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

A certain class of magnet misalignments in storage rings and other accelerators produces closed orbit distortions (CODs). Quite often the CODs are measured at a fewer number of locations (N) than the number of misalignment parameters (M). There is a linear relation between COD measurements, $u(k)$, $k = 1, \dots, N$ and the misalignment parameters $e(k)$, $k = 1, \dots, M$. Hence the $e(k)$'s are underdetermined. If $M = 2N$, one can obtain an overdetermined set of equations by measuring the COD at two different quadrupole settings. There are several ways of inverting the COD measurements to get misalignment parameters that are fairly insensitive to errors in the measured CODs. A computer program called CODINV has been written to test some of these schemes. Two schemes give fairly good results when applied to the lattice of the Los Alamos Proton Storage Ring (PSR). The first scheme requires measurements at two nearby tunes and the use of singular value decomposition methods. The second scheme requires measurements of the CODs in the FODO and DFOD cell arrangements but is easier mathematically.

Publications describing the code:

John E. Warren and P. E. Channell, "New Method for Inverting the Closed Orbit Distortion Problem," Part A, vol. Conf., Santa Fe, IEEE Trans NS-30(1983) 2415.

John E. Warren, "Determination of Magnet Misalignments from Measurement of Closed Orbit Distortion," Los Alamos National Laboratory Internal Report A1-6, A1N-83-13 (1983).

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

Contact Barbara Blind, A1-6, MS H808, Los Alamos National Laboratory (505) 667-0130.

Source Language: FORTRAN 77

Computers it runs on: VAX

Is it available as: ☒ source code ☐ executable only

Source Media: ☐ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☒ Networks

Tape format: 9 track, 1600 bpi

Diskette size & format:

Available through: ☐ DECNET, ☒ ARPANET, ☒ BITNET

Network Address: bks@hul.arpa

Date of Latest Version: unknown

Program Name: COMFAC

Person to Contact: Hamid Shoaee

Address: SLAC Bldg 26

P.O. Box 4349

Stanford, CA 94305

Telephone Number: AT&T 415 354 3300 x 4141S 461 3300 x 2934

Classification of Computer Code:

Component Design:

Ion Source, Magnet, RF cavity,

Accelerator Optimization:

Linac, Cyclotron, Synchrotron, X Insertion lines and circular machines

Tracking or Simulation:

Linac, Cyclotron, Synchrotron,

Analysis:

Stability, Impedances,

Other: control

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

A lattice program for analysis and control of charged particle beam transport systems. Main features include:

1) MAD style input format

2) Linear lattice parameter

3) Linear lattice matching

4) Chromaticity correction

5) Beam and RF parameter calculations for rings

Publications describing the code:

M. D. Woodley, M. T. Lee, J. Jager, A. S. Chang, "Control of Machine Functions for Transport Systems", IEEE Trans., 30, 6 (1983), 1367

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

☒ on Hard-shore

source code image: ☐ FORTRAN ☒

Computer(s) it runs on: VAX, cyber, IBM, 486, etc.

Is a reference to source code ☐ available only

source: ☒ diskette ☐ tape ☐ floppy ☐ card ☐ network
☐ tape format

☐ Diskette image format

Available through: ☐ DDC ☒ JET ☐ ARPA ☐ JET ☐ BNL ☐ JET

Accession Number:

Date of Latest Version: 1986

Program Name: COSY 5.0

Person to Contact: Martin Berz or H. Wollnik

Address: II Physikalisches Institut
Heinrich Buffring 14-16
6300 Giessen,
Fed. Rep. Germany

Telephone Number: 641 702-2770

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☒ Cyclotron, ☒ Synchrotron, ☒ Optical Systems

Tracking or Simulation:

☐ Linac, ☒ Cyclotron, ☒ Synchrotron, ☒ optics

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

Fifth order matrix transport and method of power series tracking, usual beam line elements, arbitrary field distributions and fringe fields, fitting capabilities, space charge (under development), very general input language

Publications describing the code:

M. Berz, H.-C. Hofmann and H. Wollnik, "COSY 5.0", Proceedings of Second Charged Particle Optics Conference, Albuquerque, 1986. To be published in "Nuclear Instrument and Methods"

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

Contact above address

Source language: FORTRAN

Computers it runs on: VAX, Cyber, CRAY

How available as: ☒ Source code, ☐ Executable only

Source Media: ☐ Listing, ☒ Tape, ☒ Diskette, ☐ Cards, ☒ Networks

Tape format: as desired

Diskette size & format: as desired

Available through: ☐ DECNET, ☐ ARPANET, ☒ BITNET

Network Address: ng2f@giessc01bitnet

Date of Latest Version: 1974

Program Name: DDC-AV-17-1773

Person to Contact: Program Library, or C. Iselin

Address: CERN

DD Div. LEP Theory Group

CH-1211 Geneva 23

Switzerland

Telephone Number: (22) 83 23 77 or (22) 83 36 77

Classification of Computer Code:

Component Design:

Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☒ Linac, ☐ Cyclotron, ☒ Synchrotron, ☒ Beam Transport

Analysis:

Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

Tracking of particles with first- and second-order matrix formalism. Optional Decay included

Publications describing the code:

CERN 74 02

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

Contact C. Iselin. (You can also contact Dave Carey at Fermilab (312) 840-3630)

Source language: FORTRAN 66

Computers it runs on: IBM CDC

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☐ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☐ Network

Tape format: 9 track 1600 bpi

Diskette size & format:

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address: 101 @ CERN VM

Date of Latest Version: 1986

Program Name: DF2D

Person to Contact: Fan Mingwu

Address: Institute of Atomic Energy

P. O. Box 275

Beijing

P. R. of China

Telephone Number: Beijing 868221 ext 341

Classification of Computer Code:

Component Design:

☐ Ion Source, ☒ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

Calculate static magnetic field, electric field and eddy current problems in two cartesian dimensions or cylindrically symmetric configuration with permeable iron. It is based on Finite Element Methods and consists of three codes: MESH2D, DE2D, and DE2DD.

Publications describing the code:

Fan Mingwu, Mao Yixin and Yan Weih, "DF2D - Interactive Software Package for 2D Magnetostatic, Electrostatic and Eddy Current Field Computations." IEEE Trans. Mag. 21(1985)2539

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

Contact Institute of Atomic Energy at above address

Source language: FORTRAN 77

Computer it runs on: VAX, PDP, IBM PC, XT

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☒ Listing, ☒ Tape, ☒ Diskette, ☐ Cards, ☐ Network

Tape format:

Diskette size & format:

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address:

Date of Latest Version: 1973

Program Name: DIFULFA

Person to Contact: Herbert F. Vogel
Address: MS B220, Group X-2
Los Alamos National Laboratory
Los Alamos, NM 87545
USA

Telephone Number: (505) 667-8949, FTS 843-8949

Classification of Computer Code:

Component Design:

☐ Ion Source, ☒ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

2-d eddy currents and their magnetic field driven from a current source with arbitrary pulse shape.
Implementation by modification of the Poisson code, i.e., current normal to the (B_x, B_y) or (B_r, B_z) plane

Publications describing the code:

None

Is code documentation available? ☐ Yes ☒ No

How may the code be obtained?

Source language: FORTRAN

Computers it runs on: CDC 7600

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☐ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format:

Diskette size & format:

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address

Date of Latest Version: Jan 1986

Program Name: DLMV

Person to Contact: R. Servranckx

Address: SLAC

P.O. Box 4349

Stanford, CA 94025

USA

Telephone Number: (415) 854-3300 ext. 2741 or (306) 966-6054

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☐ RF-cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☒ Synchrotron, ☒ Rings, Beam Lines

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☒ Synchrotron, ☒ Rings, Beam Lines

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

1) General design fittings

2) Basis: Transport, 2nd order formalism

3) Closed orbit studies: stable or unstable special resonance extraction studies

4) Extensive error and misalignment handling capabilities.

Publications describing the code:

SLAC Report 285 UC 28(A)

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

Contact Roger Servranckx

Source language: FORTRAN

Computers it runs on: VAX, IBM, CDC

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☐ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☒ Networks

Tape format: ☐ 1600 BPI

Diskette size & format:

Available through: ☐ DECNET, ☐ ARPANET, ☒ BITNET

Network Address: RVS@SLACVM

Date of Latest Version: 1981

Program Name: DISPER

Person to Contact: S. O. Schnier

Address: AT Division, MS H811,
Los Alamos National Laboratory
Los Alamos, NM 87545
USA

Telephone Number: (505) 867-7634, FTS 843-7634

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☒ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

Program DISPER does a weighted, non-linear, least squares fit to experimentally measured frequencies of mode spectra from arrays of rf cavities. The fit can be for singly or doubly periodic systems with up to second neighbor coupling constants and various end cavity terminations. The fit is to a model consisting of coupled RLC circuits.

Publications describing the code:

S. O. Schnier, "Fitting of an Ordered Set of Mode Frequencies," Atomic Energy of Canada Limited, Report No. AECL 3669 (1970)

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

From the author: see above, H. Euteneur, Inst. für Kernphysik, Universität Mainz, Postfach 3980, 6500 Mainz, BRD, S. Inagaki, KEK - National Laboratory for High Energy Physics, Oho-Machi, Tsukuba, Gun. Ibaraki Ken, JAPAN 300-32

Source language: FORTRAN

Computers it runs on: CDC, CYBER

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☐ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format:

Diskette size & format:

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address:

Date of Latest Version: July 1985

Program Name: DISPERSION

Person to Contact: Eric N. Opp
Address: MRJ Inc., Suite 200
10455 White Granite Dr.
Oakton, VA 22124
USA

Telephone Number: (202) 385-0818

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☒ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

DISPERSION calculates the frequency dispersion relation $\omega(k)$ for the azimuthally symmetric modes in a periodic array of rf cavities. The code is a modification of the SUPERFISH package. The codes LATTICE (mesh generator) and SUPERFISH were modified. LATTICE was modified to set up the appropriate periodic boundary conditions for the basic structure cell.

Publications describing the code:

R. L. Gluckstern and E. N. Opp, "Calculation of Dispersion Curves in Periodic Structures," IEEE Trans. MAG-21 (1985) 2344

E. N. Opp, "Calculation of Dispersion Curves in Periodic Structures Using SUPERFISH," Los Alamos National Lab. Internal Report AT-6-ATN-85-4, (1985)

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

Contact the Los Alamos Code Group, MS H829, Los Alamos National Laboratory, Los Alamos, NM 87545, phone (505) 667-6677 or 667-2839

Source language: FORTRAN

Computers it runs on: CRAY, VAX

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☐ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☒ Networks

Tape format: ☐ Cray, ☒ 1600 bpi

Diskette size & format:

Available through: ☐ DECNET, ☒ ARPANET, ☒ BITNET

Network Address: hks@lanl.lanl.gov

Date of Latest Version: Nov. 1982

Program Name: EBQ

Person to Contact: Arthur C. Paul L-626
Address: Lawrence Livermore National Laboratory
Livermore, CA 94550
USA

Telephone Number: (415) 423-3183, ETS 543-3183

Classification of Computer Code:

Component Design:

☒ Ion Source, ☐ Magnet, ☐ RF cavity, ☒ Ion and Electron Guns

Accelerator Optimization:

☒ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☒ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☒ Particle Distribution

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

The EBQ (electric field E, magnetic fields B, and space charge Q) code simulates steady state problems involving space charge transport of charged particles in cylindrically symmetric devices, providing a fairly flexible and forgiving data input structure.

This two-dimensional program accepts data specifying the externally applied electric and magnetic fields. The electric and magnetic self fields of the particles are used to obtain self-consistent azimuthally symmetric charge and current distributions. The code follows particle trajectories and employs a unique method of assigning values of the charge density to grid points. This method provides sufficient accuracy to model the cancellation that occurs between radial electric and magnetic self forces in a relativistic beam.

The orbits are treated in Cartesian geometry (position and momentum) with z as the independent variable. Poisson's equation is solved in cylindrical geometry on an orthogonal rectangular mesh.

EBQ can also handle problems involving multiple ion species where the space charge forces from each must be included -- such problems arise in the design of ion sources where different charge and mass states are present.

Publications describing the code:

Lawrence Berkeley Laboratory Internal Report LBL-13241

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

Contact Arthur Paul

Source language: FORTRAN IV

Computer it runs on: CDC 3600

• It is available as: ☒ Source code, ☐ Executable only

Source Media: ☐ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format: 7 track BCD.

Diskette size & format:

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address:

Date of Latest Version: 1986

Program Name: EDDYNET

Person to Contact: Larry Turner

Address: Argonne National Laboratory
9700 S. Cass Ave.
Argonne, IL 60439-4844
U.S.A.

Telephone Number: (312)972-6257, FTS 972-6257

Classification of Computer Code:

Component Design:

Ion Source, ☒ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

Stability, ☐ Impedances, ☒ Eddy Currents

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

EDDYNET uses a wire grid approach to solve eddy current problems. The conducting surface is approximated by a quadrilateral mesh of conducting lines. Line resistances and loop inductances are defined in a manner consistent with the approximation. The system of loop equations, with a dense matrix, is solved repeatedly to give the time development of the eddy currents, magnetic field, and dissipated power.

Publications describing the code:

L. R. Turner and R. J. Lari "Developments in Eddy Current Computations with EDDYNET" IEEE Trans. MAG, 19(1983)2577-80.

L. R. Turner "Eddy Current Analysis of the 'T' P Shells with EDDYNET" Computational Electronics, Elsevier Science Publishers (1986) pp 181-89.

Is code documentation available? ☐ Yes, ☒ No

How may the code be obtained?

Contact Larry Turner

Source Language: FORTRAN

Computer it runs on: IBM, CRAY

It is available as: ☐ source code, ☒ Executable only

Source Media: ☐ Floppy, ☐ Tape, ☐ Diskette, ☐ Card, ☐ Network,
☐ Tape format,
☐ Diskette, ☐ other format

Available through: ☐ DDC 56-1, ☐ ARPANET, ☐ BITNET

Network Address:

Date of Latest Version: unknown

Program Name: EFFELC

Person to Contact: S. J. Sackett

Address: L-122

Lawrence Livermore National Laboratory
Livermore, CA 94550
USA

Telephone Number: (415) 422-8709, FTS 532-8709

Classification of Computer Code:

Component Design:

☐ Ion Source, ☒ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

EFFEL calculates the electromagnetic field and vector potential in coil systems of arbitrary geometry. The coils are made from circular arc and/or straight segments of rectangular cross-sectional conductor. EFFEL can also calculate magnetic flux lines, magnetic force, and inductance. The methods used for the calculations are based on a combination analytical and numerical integration of the Biot-Savart law for a volume distribution of current. These methods yield accurate field values inside and outside the conductor.

Publications describing the code:

Steven J. Sackett, "EFFEL - A Code for Calculating the Electromagnetic Field, Force and Inductance in Coil Systems of Arbitrary Geometry," Lawrence Livermore Laboratory, Internal Report UCRL-52402, (1978)

Is code documentation available? ☐ Yes ☐ No

How may the code be obtained?

unknown

Source language: unknown

Computer: it runs on: CDC

It is available as: ☐ Source code, ☐ Executable only

Source Media: ☐ Listing, ☐ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format:

Diskette: size & format:

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address:

Date of Latest Version: May, 1986

Program Name: EC3.5

Person to Contact: W. B. Herrmannsfeldt

Address: SLAC

SLAC Bin 26

Stanford University

Stanford, CA 94305

Telephone Number: (415) 854-3300, FTS 461-9300, ext 3342

Classification of Computer Code:

Component Design:

☒ Ion Source, ☐ Magnet, ☐ RF cavity, ☒ Gun Design

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

The program is specifically written to compute trajectories of charged particles in electrostatic and magnetostatic focusing systems including the effects of space charge and self magnetic fields. Starting options include Child's Law conditions on cathodes of various shapes. Either rectangular or cylindrically symmetric geometry may be used. Magnetic fields may be specified using arbitrary configurations of coils, or the output of a magnet program such as Poisson or by an externally calculated array of the axial fields.

Publications describing the code:

SLAC 226

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

Write or call W. B. Herrmannsfeldt

Source language: FORTRAN

Computers it runs on:

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☒ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☒ Networks

Tape format:

Diskette size & format:

Available through: ☐ DECNET, ☐ ARPANET, ☒ BITNET

Network Address: LACVM@WHAP

Date of Latest Version: Oct 1985

Program Name: EMD (Expert Magnet Design)

Person to Contact: Ann Aldridge

Address: Group C-3, MS B265
Los Alamos National Laboratory
Los Alamos, NM 87545
USA

Telephone Number: (505) 667 7047, FTS 843 7047

Classification of Computer Code:

Component Design:

☐ Ion Source, ☒ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

An AI (Expert) program for designing "H" type dipole bending magnets. Given particle, energy, bend angle, etc., it designs the coil using LAMPE Standard conductor, determines ΔP , ΔT , V, I, power and prints out cross section coordinates in Poisson format for advanced field quality design.

Publications describing the code:

Internal notes, For technical info contact Ed Bush, MP 8 LANL, (505) 607 5988

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

See Ann Aldridge

Source language: LISP

Computers it runs on: VAX or VMS with UNIX

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☐ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format: as desired

Diskette size & format:

Available through: ☐ DECNET, ☒ ARPANET, ☐ BITNET
;

Network Address:

Date of Latest Version: May 1986

Program Name: EVOL

Person to Contact: Steve Peggs MS 90-1040
Address: URA Design Center
250 UCLBL
Berkeley, CA 94720
USA

Telephone Number: (415) 486-4772, 486-6559, FTS 451-4772

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☒ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other: Beam-Beam Interaction

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

EVOL is a tracking program that includes sextupoles, multiple beam-beam collisions, external tune modulation, and other effects. Its construction emphasizes operational speed and the nested scanning of two or three configuration variables, such as betatron tune, amplitude and chromaticity, at the expense of simplification in the physical model.

EVOL was originally written at CERN to simulate nonlinearities in the SPS collider. It is now being used and developed further, in round and flat beam versions, at the Cornell Electron Storage Ring (CESR). Single particles are tracked for many turns, for example 10^4 , around a nonlinear lattice in the presence of a set of physical effects chosen by the user from a "library". These effects interact with each other strongly or weakly, in ways that are theoretically understood to a greater or lesser degree.

Publications describing the code:

S. Peggs "Hadron Collider Behavior in the Nonlinear Numerical Model EVOL," Part Acc. 17 (1986) 11.

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

Contact: Steve Peggs

Source language: FORTRAN 77

Computers it runs on: VAX VMS IBM

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☐ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☒ Networks
☐ Tape format: whatever
☐ Diskette size & format

Available through: ☒ DECNET, ☒ ARPANET, ☒ BITNET

Network Address: spg@LBL

1. Date of Latest Version: 1979 Program Name: CYCLOPS

2. Person to Contact: C. Lohr
Address: TEP Theory Group
CERN
CH 1211 Geneva 23
switzerland

Telephone Number: 01-816617

Classification of Computer Code:

Component Design:

Ion Source, ☒ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

Stability, ☐ Impedances, ☐

Other: ☐

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

2nd order Finite Element

Publications describing the code:

None

Is code documentation available? ☐ Yes ☒ No

How may the code be obtained?

☐ Obsolete ☒ Code not obtainable

Source language:

Computers it runs on:

It is available as: ☐ Source code, ☒ Executable only

Source Media: ☐ Printing, ☐ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

☐ Tape format

☐ Diskette (size 2) format

Available through: ☐ DECNET, ☐ ARPANET, ☒ BITNET

Address: ☐ Address: ☐ Network:

Date of Latest Version: Dec. 1986

Program Name: GENMAP

Person to Contact: Alex L. Dragt
Address: Dept. of Physics
University of Maryland
College Park, MD 20742
USA

Telephone Number: (301)554-7324

Classification of Computer Code:

Component Design:

Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☒ Linac, ☐ Cyclotron, ☒ Synchrotron, ☐

Analysis:

Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

GENMAP 3.0 is a program to compute numerically transfer maps (through third order) for arbitrary beamline elements using Lie algebraic methods. The code uses canonical variables (x, p_x, y, p_y, t, p_t) . To study a particular beam element or transport system, the user must modify a subroutine to specify the Hamiltonian as a power series around the design trajectory. This involves specifying the electromagnetic fields in question (and various derivatives) by analytic approximations or interpolation tables. The output of GENMAP is the Lie algebraic transfer map for the system under study. GENMAP is generally used to compute transfer maps for beamline elements with fringe fields. These maps can be utilized by MARYLIE 3.0 for tracking and analysis of transport systems with realistic fringe fields. GENMAP can also be incorporated as a subroutine in MARYLIE 3.0 for optimization of systems with fringe fields.

Publications describing the code:

R. Ryne, "Numerical Computation of Transfer Maps using Lie Algebraic Methods," Los Alamos National Lab. internal report A1-6 AEN-86-24 (June 1986).

R. Ryne, "Numerical Computation of the Transfer Map for a Magnetic Dipole with Mid-Plane Symmetry using Lie Algebraic Methods," Los Alamos National Lab. internal report A1-6 AEN-86-25 (August 1986).

A. Dragt et al., "MARYLIE 3.0: A Program for Charge Particle Beam Transport Based on Lie Algebraic Methods," 1985 Users Guide, unpublished.

Forrest and P. Forest, J. Math. Phys. 24(1983):734.

Is your documentation available? ☐ Yes, ☒ No.

How may the code be obtained?

Excerpts may be made for use at Los Alamos National Laboratory.

1. 000000, beam, genmap. The version for a Bare Earth (slat) quadrupole magnet.

2. 000000, beam, genqdp. The version for a magnetic dipole with midplane symmetry.

The program and a text version of the source file. The code can also be obtained from the CERN Machine Association code group, contact Helen L. Cook at 000066, 000066, 000066, 000066, 000066, 000066, 000066, 000066, 000066, 000066.

Source language: FORTRAN 77

Computers it runs on: Any supporting FORTRAN 77

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☐ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☒ Networks

Tape format:

Diskette size & format:

Available through: ☐ DECNET, ☒ ARPANET, ☒ BITNET

Network Address: hks@hul.arpa

Date of Latest Version: unknown

Program Name: GIANT

Person to Contact: Hamid Shoaee

Address: Stanford Linear Accelerator Center
P.O. Box 4349, SLAC Bldg 26
Stanford, CA 94305
USA

Telephone Number:

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☒ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other: Control Program

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

Many model-driven diagnostic and correction procedures have been developed at SLAC for the on-line computer controlled operation of SPEAR, PEP, the LINAC, and the Electron Damping Ring. In order to facilitate future applications and enhancements, these procedures are being collected into a single program, GIANT. The program allows interactive diagnosis as well as performance optimization of any beam transport line or circular machine. The test systems for GIANT are those of the SLC projects.

Publications describing the code:

J. Jaeger, M. Lee, R. Servranckx and H. Shoaee, "GIANT: A Computer code for General Interactive Analysis of Trajectories," IEEE Trans. NS-32 (1985) 1877-82

Is code documentation available? ☐ Yes ☐ No

How may the code be obtained?

Unknown

Source language: FORTRAN 77

Computers it runs on:

It is available as: ☐ Source code, ☐ Executable only

Source Media: ☐ Listing, ☐ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format:

Diskette size & format:

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address:

Date of Latest Version: 1986

Program Name: GIOS

Person to Contact: H. Wollnik

Address: H. Physikl Institut
Heinrich Buffring 11-16
6300 Giessen,
Fed. Rep. Germany

Telephone Number: 641 702 2770

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☒ Cyclotron, ☒ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☒ Cyclotron, ☒ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other: Design of Mass Spectrometers and electromagnetic transport lines

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

Third order matrix method, usual beam line elements + fringe field approximation, fitting capabilities, space charge approximation.

Publications describing the code:

H. Wollnik, J. Brezina and M. Berz, "GIOS - BEAMTRACE, a Program for the Design of High Resolution Mass Spectrometer," 2nd Intl. Conf. on Char. Part. Optics, Albuquerque, May 19-23, 1986 NIM (to be published)

(GSI Report FHD 26 Darmstadt (1984))

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

Contact above address

Source language: Fortran

Computers it runs on: VAX, Cybe,

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☐ Listing, ☒ Tape, ☒ Diskette, ☐ Cards, ☒ Networks

Tape format: as desired

Diskette size & format: as desired

Available through: ☐ DECNET, ☐ ARPANET, ☒ BITNET

Network Address: gni@tollagsf01.bitnet

Date of Latest Version: unknown

Program Name: GO

Person to Contact: Hamid Shoaee

Address: SLAC

P.O. BOX 4349, SLAC Bldg 26

Stanford, CA 94305

USA

Telephone Number: (415) 854-3300 ext. 2954, FTS 461-9300 ext. 2954

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☐ RF-cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other: An executive program.

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

GO is an executive program placed on the PEP group's public disk (PUBRL 192) to facilitate the use of several PEP related computer programs available on VM. The exec's program list currently includes: CCELL, COLLIDER, MAGIC, PATRICIA, PETROS, TRANSPORT, and TURTLE. In addition, provisions have been made to allow addition of new programs to this list as they become available. The GO exec is directly callable from inside the Wylbur editor (in fact, currently this is the only way to use the GO exec). It provides the option of running any of the above programs in either interactive or batch mode. In the batch mode, the GO exec sends the data in the Wylbur active file along with the information required to run the job to the Latch monitor (BMON, a virtual machine that schedules and controls execution of batch jobs). This enables the user to proceed with other VM activities at his/her terminal while the job executes, thus making it of particular interest to the users with jobs requiring much CPU time to execute and/or those wishing to run multiple jobs independently. In the interactive mode, useful for small jobs requiring less CPU time, the job is executed by the user's own Virtual Machine using the data in the active file as input. At the termination of an interactive job, the GO exec facilitates examination of the output by placing it in the Wylbur active file.

Publications describing the code:

Shoaee, H., "GO, an Exec for Running the Programs: CCELL, COLLIDER, MAGIC, PATRICIA, PETROS, TRANSPORT And TURTLE," SLAC internal report No. PEP NOTE 369 (1982) 8p.

Is code documentation available? ☐ Yes ☐ No

How may the code be obtained?

Source language:

Computers it runs on:

It is available as: ☐ Source code, ☐ Executable only

Source Media: ☐ Listing, ☐ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format:

Diskette size & format:

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address:

Date of Latest Version: unknown

Program Name: GORTIN

Person to Contact: C. Kost

Address: TRIUMF, Univ. B.C.
4004 Wesbrook Mall
Vancouver, B.C.
Canada V6T 2A3

Telephone Number: 604-2221047 ext. 310

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☒ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

None available

Publications describing the code:

None available

Is code documentation available? ☐ Yes ☐ No

How may the code be obtained?

This code is not "portable" to any other institution

Source language:

Computers it runs on:

It is available as: ☐ Source code, ☐ Executable only

Source Media: ☐ Listing, ☐ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format:

Diskette size & format:

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address:

Date of Latest Version: unknown

Program Name: GOC3D

Person to Contact: A. C. Paul

Address: MS L-828

Lawrence Livermore National Laboratory

Livermore, CA 94550

USA

Telephone Number: (415) 423-3183, FTS 543-3183

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☒ General Magnetic Field

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

GOC3D is a general orbit code incorporating a flexible selection of magnetic field input geometries encountered in polar accelerator design. The code calculates the field as the sum of fields obtained from up to two independent field arrays. The main field array can be either radial (1 dimensional), median plane polar (2 dimensional) non-median plane (two dimensional r, z , input of B_r and B_z) or three dimensional with input of B_r , B_z , and B_θ . For median plane expansion the code is accurate to z^2 . The code takes z as the independent variable and will trace rays, track phase space, or determine equilibrium orbit properties of the magnetic field.

Publications describing the code:

Unknown

Is code documentation available? ☐ Yes ☐ No

How may the code be obtained?

Unknown

Source language:

Computer it runs on:

It is available as: ☐ Source code, ☐ Executable only

Source Media: ☐ Listing, ☐ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format:

Diskette size & format:

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address:

Date of Latest Version: 06-01-1985

Program Name: HARMON

Person to Contact: Martin Donald
Address: SLAC
P.O. Box 4349
Stanford, CA 94305
USA

Telephone Number: 415 854 3300, ext. 3205

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☒ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other: Beam Line Optimizer

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

Purpose: To optimize the strength of sextupole correction magnets to improve beam dynamics

Algorithms: Least Squares minimization of a set of nonlinear functions including tune shift versus momentum, tune shift versus amplitude and distortion of phase space

A new version will be released with the data based version of MAD

This version will have data input closely resembling that of MAD

The code at present will only handle closed machines. It is hoped to extend it to handle beam lines as well

Publications describing the code:

McDonald, "Chromaticity Correction in Circular Accelerators and Storage Rings: A User's Guide to the HARMON Program," PEP Note 311 (1979)

McDonald and D. Schofield, "A User's Guide to the HARMON Program," CERN LEP Note 420

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

☐ Code is a module of the program MAD by F. O. Schmidt (ERN)

☐ Code is presently only documented by publications above

Source Language: FORTRAN 77

Computer it runs on: CDC, IBM, VAX

It is available as: ☐ Source code ☐ Executable only

Source Media: Listing, * Tape, Diskette, Cards, * Networks

Tape format: ASCII or EBCDIC

Diskette size & format:

Available through: * DECNET, ARPANET, * BITNET

Network Address: MHD@SLACVM (BITNET) MHD@SLACPC (BITNET) PCR MHD (DECNET)

Date of Latest Version: Jan. 1984

Program Name: JAV

Person to Contact: Masahiro Hara

Address: Cyclotron Laboratory

RIKEN (The Institute of Physical and Chemical Research)

WAKO, SAITAMA, 351-01

Japan

Telephone Number: 0484-0-1111 ext. 4011

Classification of Computer Code:

Component Design:

Ion Source, ☐ Magnet, ☒ RF cavity, ☐

Accelerator Optimization:

Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

To calculate resonant frequencies, electric lines of force, magnetic lines of force, electric fields, and magnetic field for axi-symmetric modes (TM or TE). Based on finite element method.

Publications describing the code:

M. Hara, T. Wada, A. Toyama, and F. Kikuchi, "Calculation of RF Electromagnetic Field by Finite Element Method," Scientific Papers of the Institute of Physical and Chemical Research, 75 (1981) 143-55

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

contact author

Source language: FORTRAN 77

Computers it runs on: FACOM M380

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☐ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format: NUL-1600 bpi

Diskette size & format:

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address:

Date of Latest Version: Jan 1984

Program Name: 9.103

Person to Contact: Masahiro Hara

Address: Cyclotron Laboratory

Riken (The Institute of Physical and Chemical Research)

WAKO, SAITAMA, 351-01,

Japan

Telephone Number: 0434-62-1111 ext. 4011

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☒ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

To calculate cut-off frequencies, electric lines of force, and magnetic lines of force for waveguide with arbitrary cross section. Mesh generator and graphic display codes are included. Based on finite element method.

Publications describing the code:

M. Hara, T. Wada, A. Toyama and F. Kikuchi, "Calculation of RF Electromagnetic Field by Finite Element method," Scientific Papers of the Institute of Physical and Chemical Research, 75 (1981) 143-175.

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

Contact author

Source language: FORTRAN 77

Computers it runs on: FACOM M180

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☐ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format: NCR 34600 bpi

Diskette size & format:

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address:

Date of Latest Version: Oct. 1986

Program Name: 03

Person to Contact: Richard E. Prael
Address: MS B266, A-6
Los Alamos National Laboratory
Los Alamos, NM 87545
USA

Telephone Number: (505)667-7283 FTS 843-7283

Classification of Computer Code:

Component Design:
Ion Source, Magnet, RF cavity,
Accelerator Optimization:
Linac, Cyclotron, Synchrotron,
Tracking or Simulation:
Linac, Cyclotron, Synchrotron,
Analysis:
Stability, Impedances,
Other: Target and shielding design

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

Transport of nucleons, pions, and muons in general 3D geometry. Interaction physics by Bertini intra-nuclear cascade model with evaporation model. Couples to MCNP for transport of low energy neutrons and photons.

Publications describing the code:

R. E. Prael, "High Energy Particle Monte Carlo at Los Alamos," Los Alamos National Lab. internal report LA-UR-85-1243

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

Original ORNL version is available from Radiation Shielding Information Center (RSIC), Los Alamos. Version available upon special request from R. Prael.

Source Language: FORTRAN

Computer: it runs on CDC 5600 and CRAY

How is the code available? ☒ Source code, ☐ Executable only

Source Media: ☐ Listing, ☐ Tape, ☐ Diskette, ☐ Cards, ☐ Network,
☐ Zip format
☐ Diskette size & format

Available through: ☐ DOE NE-1 ☐ ARPANET ☐ BITNET

Network Address:

Date of Latest Version: unknown

Program Name: HOPI

Person to Contact: J. E. Le Maire

Address: Brookhaven National Laboratory
Upton, L.I., NY 11983
USA

Telephone Number:

Classification of Computer Code:

Component Design:

Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☒ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other: Control

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

HOPI, an on-line computer program written on the PDP-10, matches the beam from the 200-Mev linac to the AGS without the necessity of making emittance measurements; it performs the matching by modifying independently the horizontal and vertical emittance. Experimental results show success with this method, which can be applied to any matching section.

Publications describing the code:

Le Maire, J. E. "HOPI: On-line Injection Optimization Program," Brookhaven National Laboratory internal report no. BNL 50741 (1977) 30p.

Is code documentation available? ☐ Yes ☐ No

How may the code be obtained?

Source language:

Computer it runs on: PDP-10

It is available as ☐ Source code, ☐ Executable only

source media ☐ Listing, ☐ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

File format

Diskette size & format

Available through ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address:

Date of Latest Version: June 1986

Program Name: FFLS

Person to Contact: Michael P. Jones
Address: MS H829, Group AF-6
Los Alamos National Laboratory
Los Alamos, NM 87545
USA

Telephone Number: (505) 667-7760, FFS 811-7760

Classification of Computer Code:

Component Design:

Ion Source, Magnet, RF cavity,

Accelerator Optimization:

Linac, Cyclotron, Synchrotron,

Tracking or Simulation:

Linac, Cyclotron, Synchrotron,

Analysis:

Stability, Impedances,

Other: Modeling of intense charged particle beams

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

FLS is a fully relativistic PIC code that can handle time-dependent electromagnetic fields. It has been applied to wakefield problems in plasmas and photocathode electron source design for FEL's. There are a wide variety of options, including 1-dimensional and 2+1-2-dimensional geometry, cylindrical and Cartesian coordinates, multiple internal boundary, emission and particle creation, and optimization on CRAY computers.

Publications describing the code:

None

Is code documentation available? Yes ☒ No ☐

How may the code be obtained?

Contact M. Jones. (Note: This code is not easily transportable because it has been optimized for the Los Alamos CRAYs.)

Source language: C, F, FORTRAN

Computer it runs on: CRAY, sat VAX

Is it available as: ☒ Source code ☐ Executable only

Source Media: ☐ Listing, ☐ Tape, ☐ Diskette, ☐ Cards, ☐ Network,

☐ Tape format

☐ Diskette (i.e. 2) format

Available through: ☐ DECNET ☐ ARPANET ☐ BITNET

Internet Address:

Date of Latest Version: 12/1/1984 Program Name: ELS (ELECTRAN) 12/1/84

Person to Contact: Dr. Gary Hughes III
Address: MS B-226, X-0
Los Alamos National Laboratory
Los Alamos, NM 87545
USA

Telephone Number: (505) 845-4926 FAX: (505) 845-4926

Classification of Computer Code:

Component Design:

Ion Source, Magnet, RF cavity,

Accelerator Optimization:

Linac, Cyclotron, Synchrotron,

Tracking or Simulation:

Linac, Cyclotron, Synchrotron,

Analysis:

Stability, Impedances,

Other: Charged Particle Transport Code

Short Description (Purpose, capabilities, algorithms, special features, etc.)

Electron-photon Monte Carlo transport code. ELS is actually a system of eight codes: EIGER, EIGERP, CYLTRAN, CYLTRANP, CYLTRANM, ACCEP, ACCEP1P, AND ACCEP1M. Special features include:

1) Generalized 1-d, 2-d and 3-d analytic geometry

2) Complete particle cascade

3) External EM fields

4) Cerenkov & transition radiation

5) Well verified by experiment

These codes have been used to simulate the interaction of electron beams, generated by pulsed power accelerators, with various target materials. They are based on the ETRAN system, which was developed for an energy range from 10 keV up to a few tens of MeV. Modifications have extended their applicability up to 1 GeV. Physical theories used in the code are equivalent to those employed in the AHEAD code.

Publication(s) describing the code

M. J. Berger, "Monte Carlo Calculation of the Penetration and Diffusion of Fast Charged Particles," *Methods in Computational Physics*, Vol. 1, Academic Press, New York (1973).

J. C. Halliday and E. A. McIlhenn, "Index Report," AN-1040, 1973, November 1974.

J. A. McIlhenn and J. C. Halliday, "Monte Carlo Benchmark Calculations of Energy Deposition in Electron-Photon Cascades," *Proceedings of the American Nuclear Society on Computational Methods in Nuclear Engineering*, Internal Report, AN-1040, 1974, 1976, 1977, 1978, 1979.

J. M. Chalkover, "Published Tables of Atomic Data for Electron Transport Production by the codes ETRAN, EIGER, and EIGERP," *Electron-Photon Cascade Range Data*, "Index Report," Internal Report, AN-1040, 1973, 1974, 1975, 1976.

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

Contact Groups X-6 at Los Alamos or J. A. Halbleib at Sandia National Laboratory - Org 1231, Bldg 060
Albuquerque, NM 98123 telephone (505)844-1575 or FTS 984-1575.

Source language: FORTRAN 77

Computers it runs on: CRAY, VAX, CDC 7600, IBM

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☒ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format: VAX BACKUP

Diskette size & format:

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address:

Date of Latest Version: unknown

Program Version: 3.5001

Person to Contact: S. J. Sackett

Address: MS L 122

Lawrence Livermore National Laboratory

Livermore, CA 94550

USA

Telephone Number: (415) 422-8700 or FTS (415) 432-8700

Classification of Computer Code:

Component Design:

Ion Source, ☐ Magnet, ☐ RF cavity, ☒ Electrostatics

Accelerator Optimization:

Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

Linac, ☐ Cyclotron, ☐ Synchrotron,

Analysis:

Stability, ☐ Impedances,

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

EASON solves general electrostatics problems having either slab or cylindrical symmetry. More specifically, it solves the self-adjoint elliptic equation, $\nabla \cdot (K \nabla V) + sV + \rho = 0$ in an arbitrary two-dimensional domain. For electrostatics, V is the electrostatic potential, K is the dielectric tensor, and ρ is the free-charge density. The parameter s is identically zero for electrostatics but may have a positive nonzero value in other cases (e.g., capillary surface problems with gravity loading). The system of algebraic equations used in EASON is generated by the finite element method. Four node quadrilateral elements are used for most of the mesh. Triangular elements, however, are occasionally used on boundaries to avoid severe mesh distortions.

Publications describing the code:

S. J. Sackett, "EASON - A Code for Solving General Electrostatics Problems" (User's Manual - LLNL internal report (1980), also available from US NTEP (Natl. Tech. Info. Serv.) as report UCID-14814

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

unknown

Computer language:

Computer it runs on:

Does it run as ☐ Source code, ☐ Executable only

Source is best in ☐ Listing, ☐ Tape, ☐ Dikette, ☐ Card, ☐ Network,

☐ File format

☐ User's manual format

Access is through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Cost of Access:

Date of Latest Version: 1984

Program Name: L375

Person to Contact: E. Leclercq
Address: LEP Division
CERN
1211 GENEVA 23
Switzerland

Telephone Number: 41 22 83 34 26

Classification of Computer Code:

Component Design:

Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

Stability, ☒ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

Finds the resonant frequencies, the field pattern and the longitudinal loss factors for axisymmetric waveguide modes propagated at $v = 3c$ in disk-loaded waveguide by field matching, using matrix techniques

Publications describing the code:

E. Lecl. Nucl. Instr. Meth. 199 (1972) 419

E. Lecl. in Phys. of High Energy Particle Accelerators, AIP Conf. Proc. No. 105 (1983)

E. Lecl. CERN 84.01 (1984)

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

Contact E. Lecl.

Source language: FORTRAN 5

Computer: it runs on CDC

How available as: ☒ Source code, ☐ Executable only

Source Media: ☒ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☒ Networks

Tape format: A-coded

Diskette size & format:

Available through: ☐ DECNET, ☐ ARPANET, ☒ BITNET

Network Address: CERN CERN.CH

Date of Latest Version: 1986

Program Name: KOBRA3

Person to Contact: P. Spädtke

Address: GSI-DARMSTADT

Postfach 11 05 41

6100 DARMSTADT

Fed. Rep. Germany

Telephone Number: 6151-359-323

Classification of Computer Code:

Component Design:

☒ Ion Source, ☐ Magnet, ☐ RF cavity, ☒ low energy (DC) beam.

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☒ Synchrotron, ☐

Analysis:

☐ Stability, ☒ Impedances, ☐

Other: Transport space charge effects.

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

KODE zur Berechnung RAumladungsbefahter teilchenbahnen im-d raum.

KOBRA3 calculates the trajectories of charged particles in static electro-magnetic fields in three dimensions, including extraction problems. The electric field is determined by the potential distribution from the given electrode arrangement. Space charge is taken into account by an iterative process. The self-consistent formation of a plasma meniscus can be calculated. The magnetic field distribution is either analytically determined or read in from a table; six types of distribution are offered. The potential fields of any plane may be displayed as equipotential line drawings or by 3D diagrams, in which the potential is represented as the third coordinate. The calculated particle trajectories can be displayed by emittance diagrams, represented in two dimensions by projection onto any plane, or as three dimensional diagrams.

KOBRA is partitioned into eight programs, KOBRA1, KOBRA2, KOBRA3 and KOBRA4, which calculate the mesh, the potential, the magnetic field and the particle trajectories respectively, KOBRA5, KOBRA6, KOBRA7, and KOBRA8, which display the results.

Publications describing the code:

P. Spädtke, "KOBRA3 - Three Dimensional Raytracing Including Space Charge Effects," IEEE Trans. Nucl. Sci. 32 (1982) 2465.

Examples in Proceedings of Linac Conference, Gschwein 1984, GSI Darmstadt internal report GSI-84-11 (see conference index under Spädtke).

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

by mail or in request

Source language: ☐ Fortran ☒ ALGOL 77

Computers it runs on: ☒ IBM VAX

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☐ Listing, ☐ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format:

Diskette size & format:

Available through: ☐ DECNET, ☐ ARPANET, ☒ BITNET

Network Address: 01137DDAGS13 BITNET

Date of Latest Version: 1977

Program Name: LACC

Person to Contact: A Konrad

Address: General Electric
Corporate Research and Development
Building 37, Room 355
Schenectady, NY 12301
USA

Telephone Number: 518/387-5083

Classification of Computer Code:

Component Design:

Ion Source, Magnet, ☒ RF cavity,

Accelerator Optimization:

Linac, ☐ Cyclotron, ☐ Synchrotron,

Tracking or Simulation:

Linac, ☐ Cyclotron, ☐ Synchrotron,

Analysis:

Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

Linear Accelerator Cavity Code solves the classical electromagnetic field problem of the empty axially symmetric resonator with conducting walls. The program algorithm is based on a variational formulation coupled with the high order polynomial, triangular finite element method for the magnetic field calculation. Various other numerical methods such as one- and two-dimensional Newton-Cotes integration are used to obtain the performance measuring quantities (e.g. transit time factor, stored energy, power loss, shunt impedance, Q-factor). This is a modification of a 1973 program called AXISYMM VECTOR HELMHOLTZ FINTELE.

Publications describing the code:

A. Konrad, "A Linear Accelerator Cavity Code Based on the Finite Element Method," Comput. Phys. Commun. v.13 (1978) 349-362.

A. Konrad, "A Linear Accelerator Cavity Field Calculation by the Finite Element Method," IEEE Trans. NS-20 (1973) 802-808.

A. Konrad, "Evaluation of the LACC Program," Comput. Phys. Commun. (Netherlands) v.14 (1978) 177-184.

Is code documentation available? ☐ Yes ☐ No

How may the code be obtained?

CFR Program Library, Queen's University, Belfast, Ireland

Source language: FORTRAN IV

Computer(s) it runs on: IBM 360/35

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☐ Taping, ☐ Tape, ☐ Diskette, ☐ Cards, ☐ Network,

Tape format:

Diskette in: ☐ 5 format

Archive through: ☐ DECNET ☐ ARPANET ☐ BITNET

Network Address:

Date of Latest Version: unknown

Program Name: FMAAGF

Person to Contact: P. Fernandes

Address: Institute per la Matematica Applicata
I.M.A. S.r.l.
Genova
Italy

Telephone Number:

Classification of Computer Code:

Component Design:

Ion Source: ☐ Magnet: ☒ RF cavity:

Accelerator Optimization:

Lamac: ☐ Cyclotron: ☐ Synchrotron:

Tracking or Simulation:

Lamac: ☐ Cyclotron: ☐ Synchrotron:

Analysis:

Stability: ☐ Impedances:

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

FMAAGF is an improved version of the FALA program to compute resonant frequencies and fields for all the modes of the lowest FMA band pass of multicell structures.

Publications describing the code:

P. Fernandes, R. Parodi: "FMAAGF - A Computer Program to Calculate the FMA_q Modes of Cylindrically Symmetrical Multicell Resonant Structures." Part. Accel. 12(1982)131-5.

Is code documentation available? ☐ Yes ☐ No

How may the code be obtained?

unknown

Source language:

Computers it runs on:

It is available as: ☐ Source code, ☐ Executable only

Source Media: ☐ Listing, ☐ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format:

Diskette size & format:

Available through: ☐ DECNET ☐ ARPANET ☐ BITNET

Network Address:

Date of Latest Version: unknown

Program Name: LANS

Person to Contact: B. M. Fomel

Address: USSR Academy of Sciences
Siberian Division
Institute of Nuclear Physics
Novosibirsk, 90
USSR

Telephone Number:

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

LANS is a code developed for calculation of axisymmetric cavities. The mathematical basis of this code is the method of inverse iterations with a shift, which is the most adequate for the problem of finding the eigenfrequencies and fields for the cavities. This code has some advantages compared with SUPERFISH, it requires a smaller number of operations necessary for calculations and it gives better resolution of resonance modes with close frequencies.

Publications describing the code:

B. M. Fomel, V. P. Jackowlev, M. M. Karlner, P. B. Lysyansky, "LANS - A New Code for Evaluation of the Electromagnetic Fields and Resonance Frequencies of Axisymmetrical RF Cavities," Part A: J. Sci. (United Kingdom) 11 (1981) 173-9.

Is code documentation available? ☐ Yes ☐ No

How may the code be obtained?

unknown

Source language:

Computers it runs on:

It is available as: ☐ Source code, ☐ Executable only

Source Media: ☐ Listing, ☐ Tape, ☐ Diskette, ☐ Cards, ☐ Networks
☐ Tape format:

Diskette size & format:

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address:

Date of Latest Version: unknown

Program Name: LATTICE

Person to Contact: John Staples

Address: Lawrence Berkeley Laboratory
Bldg. 84, Room 224A
1 Cyclotron Rd.
Berkeley, CA 94720

Telephone Number:

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☒ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

LATTICE is a computer code which enables an interactive user to calculate the functions of a synchrotron lattice. This program satisfies the requirements at LBL for a simple interactive lattice program by borrowing ideas from both TRANSPORT and SYNCH. A fitting routine is included.

A version of LATTICE exists that is written in BASIC and runs on HP 9845.

John Staples and Arthur C. Paul have diverging versions in Pascal which run on the IBM PC. The latter version is self booting with complete on line documentation. Address: Arthur C. Paul, MS L 626, Lawrence Livermore National Laboratory, P.O. box 808, Livermore, CA 94550.

Publications describing the code:

John Staples, "LATTICE: An interactive lattice computer code," LBL internal report no. LBL 4843, (1976) 18p.

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

Contact: John Staples

Source language: FORTRAN

Computers it runs on: CDC 6600

It is available as: ☐ Source code, ☐ Executable only

Source Media: ☐ Listing, ☐ Tape, ☐ Diskette, ☐ Cards, ☐ Networks
Tape format:

Diskette size & format:

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address:

Date of Latest Version: July 1986

Program Name: LIEPOF

Person to Contact: Etienne Forest

Address: MS 90-1040

URA Design Center

c/o UCBL

Berkeley, CA 94720

USA

Telephone Number: (415) 496-6580 or FTS 451-6580

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☒ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

LIEPOF generates a Lie-algebraic map that produces tracking results equivalent those produced by the code TEAPOF. This allows the user to interface with the code MARYLIE and hence calculate auxiliary quantities such as chromaticity and nonlinear invariants. The results are equivalent to 6x6 third order transport matrices.

Publications describing the code:

E. Forest, "Lie Algebraic Maps and Invariants Produced by Tracking Codes," SSC Design Group internal report no. 78 (1986)

Lie Algebraic Maps and Invariants Produced by Tracking Codes

Is code documentation available? ☐ Yes ☒ No

How may the code be obtained?

Contact Etienne Forest

Source language: FORTRAN 77

Computer it runs on: CRAY XMP VAX

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☐ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format: As desired

Diskette size & format:

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address:

Date of Latest Version: 1980

Program Name: LMAF

Person to Contact: G. von Holtz
Address: TEP Theory Division
CERN
1211 GENEVA 23
Switzerland

Telephone Number: CERN 41 22 83 53 93

Classification of Computer Code:

Component Design:

Ion Source, ☐ Magnet, ☐ RF cavity,

Accelerator Optimization:

Linac, ☐ Cyclotron, ☐ Synchrotron,

Tracking or Simulation:

Linac, ☐ Cyclotron, ☒ Synchrotron,

Analysis:

Stability, ☐ Impedances,

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

A fast and flexible many particle tracking code in transverse and longitudinal phase space, using matrix formalism and bunched linear or non-linear perturbations with systematic, harmonic or random azimuthal distributions. In particular it is useful for studies of non-linear resonances, etc.

Publications describing the code:

"User Guide to the Synchrotron Tracking Computer Program LMAFRA" G. Von Holtz, CERN 1981, PA Int. 75-3

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

From author

Source language: FORTRAN

Computer: it runs on: IBM

How available as: ☒ Source code, ☐ Executable only

Source Media: ☐ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☐ Network,

Tape format

Diskette size & format

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address:

Date of Latest Version: 1979

Program Name: LINDA

Person to Contact: Stanley Snowden

Address: FNAL

P.O. Box 500

Batavia, IL 60510

USA

Telephone Number: (312) 840-3804, FTS 370-3804

Classification of Computer Code:

Component Design:

☐ Ion Source, ☒ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

LINDA uses a combination of scalar and vector potentials to model 2-D magnetostatic problems. The code is very accurate and can handle up to 30,000 mesh points. Will handle iron with nonuniform permeability. Main limitation is that there can be only one region of iron in the problem. Input is much simpler than that for POISSON.

Publications describing the code:

J. S. Colomas, "Particle Accelerator Design Computer Programs," Academic Press, New York (1971) 39-62

Is code documentation available? ☐ Yes ☐ No

How may the code be obtained?

Contact: Stan Snowden

Source Language: FORTRAN

Computers it runs on: IBM 360, 75, CDC 6600

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☐ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☐ Networks
☐ Tape format:

Diskette size & format:

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address:

Date of Latest Version: 1984

Program Name: LOOPER

Person to Contact: S. O. Schröber

Address: AI Division, MS B811

Los Alamos National Laboratory

Los Alamos, NM 87545

USA

Telephone Number: (505) 667-7634, FTS 843-7634

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☒ RF cavity, ☐

Accelerator Optimization:

☒ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☒ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

Program LOOPER calculates the rf characteristics (as seen by the drive and/or component elements) of coupled rf resonators using coupled RLC circuit theory. Input of cavity Q and impedance permits calculation of power losses and average on axis fields that agree very well with multicell SUPERFISH calculations. The program handles off resonance characteristics, all passband modes, beam loading, multi neighbor coupling, each element different, stability, and bridges between linacs.

Publications describing the code:

None

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

From the author, see above, H. Fritzsche, Inst. für Kernphysik, Universität Mainz, Postfach 3980, 6500 Mainz, BRD, or, Inagaki, KEK - National Laboratory for High Energy Physics, Oho Machi, Tsukuba, Ibaraki Len, JAPAN 300-32

Source language: FORTRAN

Computer it runs on: CDC CYBER

It is available as: ☒ Source code, ☐ Executable only

source Media: ☐ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format:

Diskette: rse 8 format

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address:

Date of Latest Version: Nov. 1986

Program Name: LERACK

Person to Contact: Dummie Chan
Address: AL-6 MS H829
Los Alamos National Lab
Los Alamos, NM 87545
USA

Telephone Number: (705)665-0376 or FTS 845-0376

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☒ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

LERACK is a first order matrix, beam transport code that takes into account the longitudinal wake force of the monopole modes and the transverse wake force of the dipole and quadrupole modes. Provision is made for error analysis, including orbit correction. It has been used in the study of wake effects in the Stanford Linear Collider (SLC) and in the Los Alamos Free Electron Laser Energy Recovery Experiment (FEL-ERX). The present version is very similar to that developed at SLAC by Karl Bane except that bending magnet and edge rotation has been added. A user's package with explanations for code installation has been prepared.

Publications describing the code:

A.W. Chan and R.K. Cooper, "Transverse Quadrupole Wakefield Effects in High-Intensity Linacs," Part A, vol. 13 (1980) 12.

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

Contact Dummie Chan or The Los Alamos Accelerator Code Group by calling Helen E. Stokes, (705) 665-0376 or (705) 665-0379.

Source Language: FORTRAN

Computer it runs on: CRAY

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☐ Printing, ☒ Tape, ☐ Diskette, ☐ Cards, ☐ Network

Tape format:

Diskette: *unix* format

Available through: ☐ DECNET, ☒ ARPANET, ☐ BITNET

Network Address: h829@lanl.mps

Date of Latest Version: 1986

Program Name: MAD

Person to Contact: C. Iselin

Address: LEP Theory Group
CERN
CH-1211 Geneva 23
Switzerland

Telephone Number: (22) 83 36 57

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☒ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

Programming system with a common data base for optics and design. Includes survey, linear lattice, matching, tracking.

Publications describing the code:

C. Iselin, "The MAD Program," CERN LEP TH 85-15

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

☒ Tape or Network

Source language: FORTRAN 77

Computers it runs on: IBM, CDC, VAX, NOVO

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☐ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☒ Networks

Tape format: 9 track 1600 bpi

Diskette size & format:

Available through: ☐ DECNET, ☐ ARPANET, ☒ BITNET

Network Address: LEP@CERNVM

Date of Latest Version: 1987

Program Name: MADEST

Person to Contact: K. M. Thompson

Address: Argonne National Laboratory
9700 S. Cass Ave., Bldg. 360
Argonne, IL 60439
U.S.A.

Telephone Number: (312)972-6265 or FTS 972-6265

Classification of Computer Code:

Component Design:

☐ Ion Source, ☒ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

MADEST is an interactive program used to develop the geometrical designs for the cores and conventional coils of various types of magnets. It does NOT involve magnetic field calculations. From the designs MADEST can be used to develop cost estimates for designing, fabricating, and installing systems of magnets. The code is under development.

Publications describing the code:

K. M. Thompson, "An interactive Computer Program for the Design and Costing of Magnets," Journal de Physique C1(1984)(January)

Is code documentation available? ☐ Yes ☒ No

How may the code be obtained?

Contact K. M. Thompson

Source language: The FORTRAN version is still under development, also Hewlett-Packard BASIC

Computers it runs on: VAX, HP9845, HP200, and HP300

It is available as: ☐ Source code, ☐ Executable only

Source Media: ☐ Listing, ☐ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format:

Diskette size & format:

Available through: ☐ DDCNET, ☐ ARPANET, ☐ BITNET

Network Address:

Date of Latest Version: unknown

Program Name: MAF

Person to Contact: E. C. Brown

Address: MS L561

Lawrence Livermore National Laboratory

P.O. Box 808,

Livermore, CA 94550

Telephone Number: (415) 423-4157

Classification of Computer Code:

Component Design:

☐ Ion Source, ☒ Magnet, ☐ RF-cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

Program MAFCO is capable of calculating the magnetic fields resulting from a given set of current-carrying conductors of arbitrary two- or three- dimensional geometry in which no permeable material is present. The elements which comprise the generalized coil geometry are:

1. Circular loops with designated position and orientation in space.
2. Circular arcs with designated position and orientation in space.
3. Helices along the z axis (in the cylindrical coordinate system) with any designated pitch, starting point, and ending point.
4. Straight lines with any arbitrary orientation.
5. General elements specified by a list of points which the program connects with straight lines.

All of these elements are assumed to be infinitely thin.

Arthur C. Paul (see TRANSPORT for address) has a Pascal version which runs on the IBM PC.

Publications describing the code:

E. C. Brown and W. A. Perkins, "MAFCO - A Magnetic Field Code for Handling General Current Elements in 3-D," Univ. of California Internal Report no. UCRL 7744 (1966).

John S. Colonius, "Particle Accelerator Design - Computer Programs," Academic Press (1974) pp. 119-28.

A plotting code with documents also exists. E. N. Haratan, R. W. Moir, "A Code for Viewing MAFCO Conductors from any Angle," Univ. of California Internal Report no. UCRL 50696 (1973).

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

unknown

Source language: FORTRAN

Computers it runs on: CDC 6600 7600

It is available as: ☐ Source code, ☐ Executable only

Source Media: ☐ Listing, ☐ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format:

Diskette size & format:

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET
☐

Network Address:

Date of Latest Version: unknown

Program Name: MAFCOIII

Person to Contact: S. J. Sackett

Address: MS L-122

Lawrence Livermore National Laboratory

Livermore, CA 94550

USA

Telephone Number: (415) 422-8709, FTS 532-8709

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☒ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☒ Linac, ☐ Cyclotron, ☒ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

Program MAFCOIII is a combination of MAFCO and ZAM. MAFCO performs the calculation of the magnetic and/or electric fields resulting from the coil configuration specified; while ZAM performs the step-by-step solution of the system of first-order differential equations, by fourth-order Adams-Moulton predictor-corrector method, to obtain the particle trajectories desired. The program is extremely flexible, as evidenced by the generalized coil geometry that MAFCO accepts.

Publications describing the code:

W. A. Perkins and S. J. Sackett, "MAFCOIII - A Code for Calculating Particle Trajectories in Magnetic and Electric Fields," Lawrence Berkeley Laboratory internal report LBL-765 (1972)

F. S. Colonna, "Particle Accelerator Design - Computer Programs," Academic Press (1974) 227-32

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

unknown

Source language: FORTRAN

Computers it runs on: CDC 6600, 7600

It is available as: ☐ Source code, ☐ Executable only

Source Media: ☐ Listing, ☐ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format:

Diskette size & format:

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address:

Date of Latest Version: unknown

Program Name: MAFCO-W

Person to Contact: T. F. Yang

Address: University of Wisconsin
Madison, WI
USA

Telephone Number:

Classification of Computer Code:

Component Design:

☐ Ion Source, ☒ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

MAFCO-W has been written for calculating magnetic fields of finite size conductors of general configuration which can be approximated by arc segments or straight segments of rectangular cross section. The magnetic field components were obtained by integrating the Biot-Savart law over the volume of the conductor. Their mathematical expressions were first reduced to single integration analytically and then integrated numerically. The magnetic fields for the conceptual Tokamak fusion reactors UWMAK-I and II were calculated and analyzed.

Publications describing the code:

T. F. Yang, "Magnetic Field Code for Handling General Current-carrying conductors in 3-D," 5th Int'l Conf. on Magnet Technology in Frascati (1975), 203-9, published by Comitato Nazionale per l'Energia Nucleare, Frascati, Italy (1975)

Is code documentation available? ☐ Yes ☐ No

How may the code be obtained?

unknown

Source language:

Computers it runs on:

It is available as: ☐ Source code, ☐ Executable only

Source Media: ☐ Listing, ☐ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format:

Diskette size & format:

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address:

Date of Latest Version: Feb. 1986

Program Name: MAFIA

Person to Contact: Thomas Weiland
Address: Deutsches Elektronen-Synchrotron (DESY)
Notkestrasse 85 d2000
Hamburg 52
Federal Republic of Germany

Telephone Number: 49-40-8998-3196

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☒ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☒ Stability, ☒ Impedances, ☒ Wake field effects

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

MAFIA is a collection of codes (M3, R3, E31, E32, P3 and T3) for calculating the resonant frequencies and transient electromagnetic fields in a fully 3 dimensional geometry. M3 is the mesh generator. R3 generates the eigenvalue matrix. E31 is a "standard" eigenvalue solver. E32 is an eigenvalue solver that uses multigrid methods. P3 is a postprocessor that displays a variety of one and two dimensional plots of the fields in the cavity and also prints a variety of numerical results.

T3 is a 3D version of FBCT and is used for analyzing the electromagnetic interaction between bunched beams of charged particles and vacuum chambers containing rf cavities, bellows, etc. There are two postprocessors used with the code. W3COR subtracts the tube wake field from the total wake. W3OUT reads and prints a wake, it can calculate the gradient impedance, plot the bunch density, and normalize the wakes to 1 pC.

Publications describing the code:

T. Weiland, "On the Unique Numerical Solution of the Maxwellian Eigenvalue Problem in Three Dimensions," Part AeeI-17(1985)227-42

T. Weiland, Part AeeI-15(1984)245-91

T. Weiland, SLAC Linac Conf. (1986)

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

The codes are available from T. Weiland on a "friendly user" basis. Executable forms are available on Los Alamos National Laboratory computers. For more info, contact Therese Barts (505) 662-9380. The codes are also available on the MFE computer network. For information of the MFE access, contact Carol Full (415) 321-5560 or Therese Barts (415) 843-9385.

Source language: FORTRAN 77

Computers it runs on: IBM 3081, CRAY, VAX

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☐ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format: EBCDIC

Diskette size & format:

Available through: ☐ DECNET, ☐ ARPANET, ☒ BITNET

Network Address: MPYWEI%DRIHDESYS BITNET

Date of Latest Version: unknown

Program Name: MAGEFOR

Person to Contact: W. D. Cam

Address: Oak Ridge National Laboratory
Oak Ridge, TN 37830
USA

Telephone Number:

Classification of Computer Code:

Component Design:

☐ Ion Source, ☒ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

MAGEFOR calculates electromagnetic fields and forces in coil systems of arbitrary geometry. The coils may be modeled by using 20-node isoparametric hexahedrons; 8-node rectangular cross-sectional straight segments; rectangular cross-sectional circular arcs; and/or filamenting circular loops. A combination of analytical and numerical integration of the Biot-Savart law for a volume distribution of current is used for calculating magnetic fields. Volumetric body forces are calculated for the 20 node isoparametric brick by numerically integrating the vector product $\mathbf{J} \times \mathbf{B}$ over its volume, where the magnetic field at each Gauss point is obtained by interpolating the magnetic field at the node points by using shape functions. The force is distributed to the node points of the element, again using the shape functions in a consistent manner that maintains inter element torsion. Body forces obtained from MAGEFOR were compared with body forces from the computer code EFFI for several coil configurations considered in the design of the Advanced Toroidal Facility (ATF).

Publications describing the code:

W. D. Cam, "MAGEFOR: A Magnetics Code to Calculate Field and Forces in Twisted Helical Coils of Constant Cross Section," Fusion Engineering, vol. 2 (1983) 1223-1227.

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

Source language:

Computers it runs on: machine independent

It is available as: ☐ Source code, ☐ Executable only

Source Media: ☐ Listing, ☐ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format:

Diskette size & format:

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address:

Date of Latest Version: 1977

Program Name: MAGNET

Person to Contact: Program Library

Address: CERN

DD Div

CH-1211 Geneva 23

Switzerland

Telephone Number: (22) 83 2377

Classification of Computer Code:

Component Design:

☐ Ion Source, ☒ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

Magnet Design in 2 dimensions - Finite Difference Method with two Potentials

Publications describing the code:

CERN Program Library Writeup T600

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

(Contact CERN Program Library)

Source language: FORTRAN 66

Computers it runs on: IBM CDC

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☐ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format: 9 track 1600 bpi

Diskette size & format

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address:

Date of Latest Version: Oct. 1986

Program Name: MAGNET

Person to Contact: Sergio Pissanetzky
Address: Texas Accelerator Center
2319 Timberloch
The Woodlands, TX 77380
USA

Telephone Number: (713)363-0121

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

The MAGNET package for 3-D magnetic field calculations consists of the preprocessor KUBIK, the MAGNET solver, and the postprocessor EPILOG. The program employs the Finite Element Method (FEM), with a total scalar potential in regions with iron and a partial scalar potential in regions with current. The use of the total potential in iron avoids severe round off errors that would arise if a partial potential were used (small difference between large numbers). The program is interfaced with the international Graphic Kernel Systems (GKS).

The mesh generator KUBIK prompts the user to input all information describing the geometry of the problem and the desired mesh refinement. Names are also assigned to regions or materials, boundaries, etc. KUBIK is a truly 3-D mesh generator. Modules representing simple bodies, or parts of bodies, are independently defined, each with its own mesh inside. The modules are then assembled into the final 3-D structure of any degree of complexity. KUBIK runs either interactively or in batch, and accepts commands that print a variety of tables or plots.

MAGNET has a library of solid and filament conductor elements, out of which the user can construct virtually any shape in 3-D. Commands exist that will generate new conductors by deletion, addition or rotation of existing conductors, or produce tables or plots. The independent program KUBIK can be used to calculate the field of the conductors alone (no iron or boundary conditions) at any point in space. The conductors are completely independent of the mesh created by KUBIK, and can be changed without modifying the mesh. MAGNET also has a library of magnetization tables, including several American steels and Japanese steels at different temperatures, and ideal materials such as pure iron or nickel. The user can input additional tables.

The MAGNET solver obtains a solution in the mathematical sense: the magnetic potential given as a function of the coordinates at every point in the solution domain. A high efficiency, and surprisingly short execution times are achieved by means of sophisticated programming and the use of sparse matrix techniques. The solver runs in batch for the number of iterations specified by the user, or until the desired accuracy is obtained. It generates a drop file and can be restarted if so desired.

Once the solution is available, the user runs the postprocessor EPILOG interactively on TAYLOR or accepts commands that will compute and print a variety of derived quantities like 2-D averaged beamline

coefficients, spherical 3-D harmonic coefficients, energy, inductances, line or surface integrals, etc. of the field, etc. EPILOG can also generate tables of field, permeability, potential, etc. and a variety of plots. EPILOG is a very useful design tool for the physicist or engineer.

Accuracy is a primary consideration in the MAGNUS package. It is now known that a very important source of large errors is the inappropriate interpolation of magnetization tables. In MAGNUS interpolation is done using the FKP interpolation relation, the most accurate known rule. Another source of inaccuracy is round-off in the calculation of the field of solid conductors. Careful mathematical/numerical techniques have been used to rewrite the expressions in such a way that round off will not affect the results. The accuracy, even in single precision, is better than with the usual expressions in double precision. Numerical quadrature in MAGNUS is done by Carl de Boor's method, which guarantees the final accuracy, rather than by the usual n-point Gauss formula, which is very inaccurate in many cases but extensively used in other programs.

Publications describing the code:

- S. Pissanetzky, "The Interpolation of Magnetization Tables," COMPEL 5(1986)41-56.
- S. Pissanetzky, "The Design of Superferric Magnets for the Superconducting Super Collider and the New Program MAGNUS for Three-Dimensional Magnetostatics," IEEE Trans. MAG-21 (1985) 2457.
- S. Pissanetzky, "The New Version of the Finite Element 3D Magnetostatics Program MAGNUS," Comp. Electromagnetics (1986) 121-32, Ed. Elsevier Science Publ. B. V. (North Holland).
- S. Pissanetzky, "Automatic Three-Dimensional Finite Element Mesh Generation Using the Program KUBIK," Computers Phys. Comm. 32 (1984) 245-65. (See also CPC 32 (1984) 267-74).
- S. Pissanetzky, "Sparse Matrix Technology," Academic Press, London (1984).
- S. Pissanetzky, "KUBIK: An Automatic Three-Dimensional Finite Element Mesh Generator," Int. J. Num. Meth. Engng. 17(1981)255-69.

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

- By license agreement with Ferrari High Technology Products, P.O. Box 1866, Orange Park, FL 32067-1866.
- By agreement with the Texas Accelerator Center, the code is also available free of charge to some HEP groups at National Laboratories through the MFE network.

Source language: FORTRAN IV

Computers it runs on: VAX and CRAY

How available as: ☒ Source code, ☐ Executable only

Source Media: ☐ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☐ Networks
☐ Tape format
☐ Diskette size & format

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET,
☒ MFECC

Network Address:

Date of Latest Version: July 1986

Program Name: MAPPOT

Person to Contact: Eugene Forest

Address: MS 90-4040, URA Design Center
c/o CCLBL
Berkeley, CA 94720
USA

Telephone Number: (415) 486-6580, FTS 451-6580

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☒ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

MAPPOT generates a Lie-algebraic map that produces tracking results equivalent to those produced the third order matrix code RACETRACK. The output can be put into MARYLIE for the calculation of auxiliary quantities such as chromaticity and nonlinear invariants

Publications describing the code:

None yet

Is code documentation available? ☐ Yes ☒ No

How may the code be obtained?

Source language: FORTRAN 77

Computers it runs on: CRAY XMP

It is available as: ☐ Source code, ☐ Executable only

Source Media: ☐ Listing, ☐ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format

Diskette size & format

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address:

Date of Latest Version: unknown

Program Name: MARTUR

Person to Contact: I. S. Bakshev

Address: Institute of High Energy Physics
Serpukhov
USSR

Telephone Number:

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other: radiation loading calculations

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

A set of MARTUR computer codes is created to calculate spatial distributions of high-energy proton losses in accelerator structures and arising energy release, induced radioactivity, radiation loadings on equipment and shields. The set of computer codes consists of three major codes: ESSEPT - the code for simulation of initial interaction of circulating proton beam with the energy E_0 with an arbitrary "target", FURTELM - the code for calculation of particle transport; MARSET - the code for nuclear-electromagnetic cascade calculation, which appear in magnetic structure and due to the loss of transported fast protons.

Publications describing the code:

Bakshev, I. S., Maslov, M. A., Mokhov, N. V., "MARTUR Set of Computer Codes for Calculation of Particle Interactions and Transport in Proton Accelerators", All Union Conference on Charged Particle Accelerators Proceedings vol. 2 (1983) 167-170.

Is code documentation available? ☐ Yes ☐ No

How may the code be obtained?

Source language:

Computers it runs on:

It is available as: ☐ Source code, ☐ Executable only.

Source Media: ☐ Listing, ☐ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

☐ Tape format

☐ Diskette file & format

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address:

Date of Latest Version: Dec 1986

Program Name: MARYLIE

Person to Contact: Alex J. Dragt

Address: Physics Department
University of Maryland
College Park, MD 20742
USA

Telephone Number: (301) 454-7324

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☒ Synchrotron, ☐ Beam Lines and Storage Rings

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☒ Synchrotron, ☐ Beam Lines and Storage Rings

Analysis:

☒ Stability, ☐ Impedances, ☐

Other: Nonlinear Orbit Behavior, aberrations

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

The program employs algorithms based on a Lie-algebraic formulation of charged particle trajectory calculations, and is able to compute transfer maps for and trace rays through single or multiple beam-line elements. This is done for the full 6-dimensional phase space. All nonlinearities, including chromatic effects, through third (octupole) order are included. In addition, MARYLIE is exactly symplectic (canonically) through all orders.

MARYLIE may be used both for particle tracking around or through a lattice and for analysis of linear and nonlinear lattice properties. Tracking can be performed element to element, lump to lump, or any mixture of the two. (A lump is a collection of elements combined together and treated by a single transfer map.) The speed for element to element tracking is comparable to that of other codes. When collections of elements can be lumped together to form single transfer maps, tracking speeds can be orders of magnitude faster.

MARYLIE also has powerful analytic tools. They include the calculation of first, second, and third order dispersion, tunes and first and second order chromaticities, the other linear lattice functions, and their energy dependence through second order, the dependence of tune on betatron amplitude, nonlinear lattice functions, nonlinear phase space distortion, transfer map normal forms, nonlinear resonance driving terms, and nonlinear invariants. Finally, MARYLIE can be used to give an explicit representation for the linear and nonlinear properties of the total transfer map of a system. This information can be used to evaluate or improve the optical quality of a single pass system such as a beam transport line or linear collider. MARYLIE 3.0 running in double precision on a VAX 11/780 requires 1494 bytes of memory, and can evaluate (track) approximately 25 maps per second.

A vectorized version running on a CRAY X-MP in single precision and using only one processor requires 1176 words of memory, and can evaluate approximately 4000 maps per second.

Publications describing the code:

D. R. Douglas, "Lie Algebraic Methods for Particle Accelerator Theory," Ph.D. thesis, Univ. Md. (1982), unpublished.

Alex. J. Dragt, Robert D. Ryne, Liam M. Healy, Enippo Neri, David R. Douglas, Etienne Forest, "MARYLIE 3.0: A Program for Charged Particle Beam Transport Based on Lie Algebraic Methods."

David R. Douglas and Etienne Forest, "A Program for Nonlinear Analysis of Accelerator and Beamline Lattices," IEEE Trans. NS-32 (1985), 2311.

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

From Maryland when released

Source language: FORTRAN 77

Computers it runs on: CRAY, IBM, VAX, UNIVAC, CDC

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☐ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☐ Networks
Tape format:

Diskette size & format:

Available through: ☐ DECNET, ☒ ARPANET, ☒ BITNET

Network Address: dragt@umcncom

Date of Latest Version: unknown

Program Name: MASK

Person to Contact: Adam Drobot

Address: SMI
1710 Goodridge Dr
McLean, VA 22102
USA

Telephone Number:

Classification of Computer Code:

Component Design:

☒ Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

The MASK code is a 2-1/2 dimensional particle-in-cell code which has been applied to the simulation of a number of microwave devices. It has been used to simulate klystrons and other electron accelerator components.

Publications describing the code:

Eppley, K.; Brandon, S.; Drobot, A.; Hanerfeld, H.; Herrmannsfeldt, W.; Melendez, R.; Nielsen, D.; Yu, S.; "Results of Simulations of High power Klystrons," Proc. of Part. Accel. Conf. published in Trans. IEEE NS-32 (1985) 2903-2905.

Yu, S.; S.; Drobot, A.; Wilson, P.; "Two and One-half Dimension Particle-in-cell Simulation of High power Klystrons," Proc. of Part. Accel. Conf. published in Trans. IEEE NS-32 (1985) 2918-2920.

Hanerfeld, H.; "Computational Needs for Modelling Accelerator Components," SLAC internal report, SLAC PUB 3108.

Is code documentation available? ☐ Yes ☐ No

How may the code be obtained?

From Adam Drobot. (The code may also be available from SLAC, for instance from W. Herrmannsfeldt.)

Source language:

Computers it runs on:

It is available as ☐ Source code, ☐ Executable only

source Media ☐ Listing, ☐ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

☐ Tape format

☐ Diskette size & format

Available through ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address:

Date of Latest Version: July 1986

Program Name: MATRACE

Person to Contact: Etienne Forest

Address: MS 90-4040

LRA Design Center

c/o UCLBL

Berkeley, CA 94720

Telephone Number: (415) 486-6580, FTS 451-6580

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☒ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

MATRACE can be used as a postprocessor to the code RACETRACK. It will generate up to third-order matrices for variables (x, x', y, y') that give equivalent tracking results for the full ring relative to a given trajectory. This is useful for studying misalignments. The output of MATRACE can be put into MARYLIE, which can generate such quantities as chromaticity and non-linear invariants.

Publications describing the code:

E. Forest, "Lie Algebraic Maps and Invariants Produced by Tracking Codes," SSC Design Group internal report SSC-78 (1986).

Is code documentation available? ☐ Yes ☒ No

How may the code be obtained?

Call Etienne Forest

Source language: FORTRAN

Computers it runs on: VAX, CRAY XMP

It is available as: ☐ Source code, ☐ Executable only

Source Media: ☐ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format: As desired

Diskette size & format:

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address:

Date of Latest Version: Dec. 1985

Program Name: J1301

Person to Contact: C. E. Mottershead
Address: MS 11829, Group AF-6
Los Alamos National Laboratory
Los Alamos, NM 87545
USA

Telephone Number: (505) 667-9730 ETS 943-9730

Classification of Computer Code:

Component Design:
Ion Source, ☐ Magnet, ☐ RF cavity, ☐
Accelerator Optimization:
☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐
Tracking or Simulation:
☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐
Analysis:
☐ Stability, ☐ Impedances, ☐
Other: Beam Diagnostics

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

MEBT = Maximum Entropy Beam Tomography. Ion-beam particle beams require noninterceptive diagnostics. One of these is the light emitted from interaction of the beam with residual gas. If the light is produced by a first-order process linear in the beam density, its profile measured across the beam may be interpreted as a tomographic projection of that density distribution. With a small number of such projections, and appropriate transfer matrices connecting them, Muerbo's maximum entropy (MENT) algorithm may be used to construct an estimate of the beam density distribution in both coordinate and phase space. This MENT algorithm is running as part of an integrated software system on an LSI 11-23 mounted in the same diagnostic node where the data is recorded. The solution usually converges in about 5 iterations, each of which takes a few seconds in the typical case of 3 or 4 views of 25 samples each. The subroutine implementing the MENT algorithms are being rewritten to make them portable.

Publications describing the code:

- C. E. Mottershead, "Maximum Entropy Beam Diagnostic Tomography," IEEE Trans. NS-32 (1980) 1970.
- G. N. Muerbo, "MENT: A Maximum Entropy Algorithm for Reconstructing a Source from Projection Data," Comp. Graphics Image Proc., 10 (1979) 48.
- O. R. Under, G. N. Muerbo, R. A. Jameson, and D. D. Chamberlin, "Beam Tomography in Two and Four Dimensions," Proc. 1979 Linac Conf. Brookhaven National Laboratory report BNL-51134 (1979).

Is code documentation available? ☐ Yes ☒ No

How may the code be obtained?

Contact: C. E. Mottershead

Source language: FORTRAN

Computer: it runs on PDP11 & VAX

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☐ ☐ Tape, ☐ Diskette, ☐ Cards, ☒ Networks
Tape to what:

Diskette size & format:

Available through: ☐ DECNET, ☒ ARPANET, ☒ BITNET
☐

Network Address: ctmuland arpa

Date of Latest Version: June 1987

Program Name: MICADO

Person to Contact: Y. Luthi-Marti

Address: CERN Theory Division
CERN
1211 Geneva 23
Switzerland

Telephone Number: +41 22 832948

Classification of Computer Code:

Component Design:

Ion Source, Magnet, RF cavity, ☐

Accelerator Optimization:

Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

Stability, ☐ Impedances, ☒ Error correction and closed orbit correction

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

MICADO is a solver of rectangular systems of linear equations. It is recommended for over-determined systems (more equations than unknowns). The solution is iterative and gives at each iteration the most efficient solution to reduce the norm of the residual vector. It has been extensively tested for orbit correction. A recent application has been made to dynamic aperture correction.

Publications describing the code:

B. Auln and Y. Marti, "Closed orbit correction of A-G machines using a small number of magnets," CERN ISR/MA 73-17

G. Guignard, Marti, "PETROC users guide," CERN ISR/BOM/TH 81-32

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

Contact CERN Division

Source language: FORTRAN 77

Computer it runs on: IBM

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☒ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☒ Networks

Tape format: unlabeled, 1600 Bpi, 3200 char/block, 80 char/record

Diskette size & format:

Available through: ☐ DEUNE I, ☐ ARPANE I, ☒ BLINE I

Network Address: MARAC@CERNVM

Date of latest version: Jan 1989

Program Name: MIB

Person to Contact: Richard E. Franzak

Address: DESY
Notke 85
22609 Hamburg 11
Fed. Rep. Germany

Telephone Number: 43471 359370

Classification of Computer Code:

Component Design:

Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

Linac, ☐ Cyclotron, ☒ Synchrotron, ☒ Beam lines

Tracking or Simulation:

Linac, ☐ Cyclotron, ☒ Synchrotron, ☒ Beam lines

Analysis:

Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

Purpose: Design of synchrotrons and beam lines, optimization of focusing elements in first order

Algorithms: Linear matrix formalism for transformation of ellipses and single particles, tracking of single particles through linear matrices and then non linear lenses representing multipoles

Special features:

Interactive operation employing a command structure

Graphic output of envelopes, ellipses, and particle distributions

On line help available

Interactive graphics using the cursor

Detailed investigation of non linearities in synchrotrons

Publications describing the code:

R. Franzak, "MIB/90 - An Interactive Program for Beam Lines and Synchrotrons", Conference on Progress in Accelerator Design and Operation, Berlin (W.G.) 1983, 170

Springer Verlag (1984)

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

Contact author

source language: FORTRAN

Computers it runs on: VAX, IBM

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☐ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☒ Networks

Tape format: as needed

Diskette size & format:

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET
☒ EARN

Network Address: PT01 at DDAGS13

Date of Latest Version: 11/83

Program Name: MISAR

Person to Contact: Donald A. Swenson

Address: SMI

707 Marquette N.W., Suite 1200

Albuquerque, NM 87102

USA

Telephone Number: (505) 417-5787

Classification of Computer Code

Component Design:

Ion Source, Magnet, RF cavity,

Accelerator Optimization

Linac, Cyclotron, Synchrotron,

Tracking or Simulation:

Linac, Cyclotron, Synchrotron, X Accumulator Rings

Analysis:

Stability, Impedances,

other

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

MISAR is a PARMILA like multiparticle simulation code that follows the transverse coordinates of a collection of macroparticles from the inflector around the lattice of a circular machine, incorporating the space charge forces of the beam as modified by the image effects in the walls for a number of turns. No longitudinal structure in the beam is allowed. After each turn around the machine, the number of particles in the "beam" is increased by the addition of a new quantity of beam from the inflector. Provisions are made for time dependent pulsed bumps that can move the equilibrium orbit in the vicinity of the inflector to establish the multiturn injection process. As in PARMILA there are a variety of options for generating the initial coordinates of the injected beam and a variety of options for displaying the properties of the accumulated beam. The space charge effects are supplied by a SCHEFF subroutine which is called one or more times during each basic period of the lattice.

Publications describing the code:

D. A. Swenson and K. R. Crandall, "MISAR: A Particle Tracking Code for Multiturn Injection Studies in Accumulator Rings," Proc. of Workshop on Accelerator Orbit and Particle Tracking Programs, Brookhaven 1982, Brookhaven Internal Report BNL 31761. Also Los Alamos Report LA-UR-82-148.

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

Los Alamos Accelerator Code Group, c/o Bill John Warren at (505) 667-6667, ext. 667-2840, 1111 S.W. 13th

Source Language: FORTRAN

Computer it runs on: CDC 7600

It is available as: ☒ Source code ☐ Executable only

Source Media: ☐ Taping, ☒ Tape, ☐ Diskette, ☐ Cards, ☒ Networks

Tape format:

Diskette size & format:

Available through: DECNET ☒ ARPANET ☒ BITNET

Network Address: 9600bit area

Date of latest version: 11/80

Program Number: 00

Person to Contact: C. Thuesen, Los Alamos Highway
Address: MS D820, Group A1-5
Los Alamos National Laboratory
Los Alamos, NM 87545
USA

Telephone Number: 505-667-4541 x5830, 4543

Classification of Computer Code

Component Design

Ion Source, Magnet, RF cavity,

Accelerator Optimization

Linac, Cyclotron, Synchrotron, X Beam lines, mass spectrometers

Tracking or Simulation

Linac, Cyclotron, Synchrotron,

Analysis

Stability, Impedances,

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

MOFFER is a ray tracing program intended for analysis and optimization of a system of magnetic elements. Several features are included in MOFFER which are not available in other codes. Among these are Monte Carlo simulation of the beam phase space, a sophisticated definition of the performance including the possibility of computer correction of aberrations based on measurements of the trajectory of each event, the automatic optimization of any parameter of the magnet system, the possibility of the use of field maps for dipoles, quadrupoles, and multipoles, and the availability of several new element types including an FCB separator, an rf accelerating gap, a wedge degrader, and various slits and scatterers. To the greatest possible extent, MOFFER makes use of the definition of parameters identical to program RAYTRACE from which it evolved. In order to minimize the pitfalls of problem setup, it is suggested that the MOFFER user first study his problem with the standard codes TRANSPORT, FORTIF, and RAYTRACE, in that order.

Publications describing the code:

H. A. Thuesen and M. Klein, "Design of Mass Spectrometer at LANS," NIPS CONF., 199, 198, Proc. IV Int. Conf. on Magnet Technology, Brookhaven National Laboratory (1972) 3.

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

Contact the Los Alamos Accelerator Code Group (505-667-6677 ext. 667-2839) ext. 844-6677.

Source Language: FORTRAN

Computer it runs on: VAX, CRAY

It is available as: ☒ Source code, ☐ Executable only

Source file on: ☐ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☒ Network

Tape format:

Diskette format: format

Available through: ☐ DDC/EE, ☒ ARPA/EE, ☒ HUNGARY

Network Address: unknown upx

Date of latest revision: 11/11/88

Program Name: 100

Person to Contact: J. Voss, Wengert, A.
 Address: FA-2000
 University of Illinois
 Urbana, Illinois
 U.S.A. Rep. Germany

Telephone Number: 309/244-3744

Classification of Computer Code

Component Design

Ion Source, Magnet, RF cavity

Accelerator Optimization

Linac, Cyclotron, Synchrotron

Tracking or Simulation

C Linac, Cyclotron, Synchrotron, X-Beam lines

Analysis

Stability, Impedances

Other

Short Description: Purpose, capabilities, algorithms, special features, etc.

Macroparticle tracking code, non relativistic. Integrates equations of motion through any user-defined external electric and magnetic field. Built-in components: quadrupoles, solenoids, dipoles, bunching cavities, octupoles, rf gaps. Full 3D space charge. No edge focusing in dipole magnets. Initial distributions available. 4D waterbag. 40 kV/cycle. Defined. Highly specialized and time consuming code for design and analysis of low energy beam lines.

Publications describing the code

"METHODON: A Versatile Multiparticle simulation Code" by K. Murrig and D. Samitz, Proc. 1981 Linear Conference, Los Alamos Report LA-0246, 1981, p. 1-8

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

contact J. Voss, Wengert

Source program: FORTRAN 77

Computer system: CRAY T3E 120

How is code as: ☐ source code ☐ Executable only

medium of delivery: ☒ Disk ☐ Tape ☐ Microfilm ☐ Card ☐ Network

File format:

Documentation: ☒ Yes ☐ No

Availability: ☒ OPEN ☐ PROPRIETARY ☐ RESTRICTED

Network: A few

•
•
• Date of Latest Version: unknown Program Name: MULTIMODE

Person to Contact: A. I. Fedoseyev or V. A. Gusev
Address: Institute for High Energy Physics
Serpukhov
Moscow region
USSR

Telephone Number:

Classification of Computer Code:

Component Design:

Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

Linac, ☐ Cyclotron, ☐ Synchrotron,

Tracking or Simulation:

Linac, ☐ Cyclotron, ☐ Synchrotron,

Analysis:

Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

The MULTIMODE code is used for computing the lowest eigenfrequencies and electromagnetic fields in homogeneous waveguides and axially symmetric cavities. Eight node isoparametric finite elements are used, which give the exact approximation of curvilinear region boundaries and high accuracy in computations of frequencies on a small number of grid nodes. The comparison of MULTIMODE with other programs shows that MULTIMODE attains the same accuracy while running 10-100 times faster. The program allows the computation of both simple and degenerate frequencies.

Publications describing the code:

"MULTIMODE - A Powerful Code for Frequency Spectrum Computation of Electromagnetic Fields in Axially Symmetric Cavities and Longitudinally Homogeneous Waveguides of Arbitrary Shape," Nuclear Instrum. & Method. 227 (1984) 411-49.

Is code documentation available? ☐ Yes ☐ No

How may the code be obtained?

Source language:

Computer: ☐ Runs on:

Is ☐ Source code, ☐ Executable only

Source Media: ☐ Listing, ☐ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

☐ Tape format

☐ Diskette size & format

Available through: ☐ DECNET ☐ ARPANET ☐ BITNET

Network Address:

Date of Latest Version: 1980

Program Number: 33

Person to Contact: J. Saurer or A. Chambert

Address: GANIL
Boite Postal 5027
F-14000 CAEN
France

Telephone Number: 31 45 46 47

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☒ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☒ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

This is a general multiparticle code developed for studying particle motion in cyclotrons. Related to the structure of the GANIL separated-sector cyclotrons, it could be adapted to other configurations.

Its main limitation comes from the shape of the accelerating gaps which are presently restricted to radial ones. Accelerating field effects are expressed as kicks applied at the gap centers allowing for a complete decoupling in the treatment of the magnetic and electric fields.

Simplified versions have been derived, restricted either to the median plane (IOAN) or to a single particle in this plane (ANJO). In its most general version the code takes into account space-charge effects. A more precise description of these codes including listings and examples is given in the internal report listed below.

Publications describing the code:

J. Saurer, A. Chabert and M. Prome, "Multiparticle Codes Developed at GANIL," in the Proc. of the Conf. on "Accelerator Design and Operation" Berlin (1983) 164-9, Springer-Verlag, 1984.

Le Groupe Theorie Parametres, "Les Programmes ANJO, IOAN, NAJO," GANIL Internal Report 80R-132-TP-06.

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

J. Saurer or A. Chambert

Source language: FORTRAN

Computers it runs on: UNIVAC 1108, (MOPCOMP in the near future)

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☒ Listing, ☒ Tape, ☒ Diskette, ☐ Cards, ☐ Networks

Tape format: COMPTE

Diskette size & format: IBM 3210

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address:

Date of Latest Version: 1983

Program Name: OPTIC

Person to Contact: Joe Tesmer

Address: MS K764, Group P-10
Los Alamos National Laboratory
Los Alamos, NM 87545
USA

Telephone Number: (505) 667-6370, FTS 843-6370

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☒ Electrostatic Accelerator

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☒ Electrostatic Accelerator

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

Early program used for beam optics in electrostatic accelerators. Good treatment of accelerating tubes and strippers. Time dispersion treatment of bunched beams.

Custodian: J. D. Larson, 10011 E 35th Terr., Independence, MO 64052

Based on code by T. J. Devlin (UCRL-9727)

Publications describing the code:

T. J. Deubur, Univ. of California Internal Report UCRL 9727

S. Penner, "Calculations of Properties of Magnetic Deflection Systems," Rev. Sci. Inst. 32 (1961) 170

J. D. Larson, "New Developments in Beam Transport Through Tandem Accelerators," Nuclear Inst. and Methods, 122 (1974) 53-63

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

Contact Joe Tesmer

Source language: FORTRAN

Computers it runs on: VAX

It is available as: ☒ Source code, ☐ Executable only

source Media: ☐ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format: As desired

Diskette size & format:

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address:

Date of Latest Version: unknown

Program Name: OSCAR2.0

Person to Contact: Paolo Fernandez

Address: Istituto per la Matematica Applicata
Consiglio Nazionale delle Ricerche
Via L. B. Alberti, 4
16132 Genova, ITALY

Telephone Number: unknown

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☒ RF-cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

This is a 2-D rf cavity code. (No more information available at this time)

Publications describing the code:

unknown

Is code documentation available? ☐ Yes ☐ No

How may the code be obtained?

Source language:

Computers it runs on:

It is available as: ☐ Source code, ☐ Executable only

Source Media: ☐ Listing, ☐ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format:

Diskette size & format:

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address:

• Date of Latest Version: Nov. 1985 Program Name: PANDIRA GROUP CODES

Person to Contact: Los Alamos Accelerator Code Group
Address: MS H829, Group A1-6
Los Alamos National Laboratory
Los Alamos, NM 87545
USA

Telephone Number: (505) 867-9131 or 867-2839, FTS 843-9131

Classification of Computer Code:

Component Design:

☐ Ion Source, ☒ Magnet, ☐ RF-cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

Calculates static magnetic field in two cartesian dimensions or cylindrically symmetric configurations in 3D. Handles permanent magnet materials as well as permeable iron and current carrying coils. Can solve ferroelectric problems also. Uses the "direct" method to solve the 2D, generalized POISSON equation. Included in the group of codes is AUTOMESH, LATTICE, and FORCE.

Publications describing the code:

K. Halbach, "Design of Permanent Multipole Magnets with Oriented Rare Earth Cobalt Materials,"
Nucl. Inst. and Meth., 169 (1980) 1-10

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

Send blank tape to above address; specifying version desired (VAX or CRAY). Also available through ARPANET, DECNET or BITNET; telephone for instructions.

Source language: FORTRAN 77

Computers it runs on:

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☐ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☒ Networks

Tape format: 9 track, 1600 bpi, 80 char/line

Diskette size & format:

Available through: ☐ DECNET, ☒ ARPANET, ☒ BITNET

Network Address: hks@lanl.arpa

Date of Latest Version: unknown

Program Name: PAQUASEX

Person to Contact: S. Kheifets

Address: Stanford Linear Accelerator Center
Stanford University,
Stanford, CA 94305
USA

Telephone Number:

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☒ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

PAQUASEX is essentially a combination of the three codes PATRICIA, QUADS, and MICROSEX. The system is designed to do a configuration survey over a grid of points in the space of main configuration parameters $v_x, v_y, \beta_x^*, \beta_y^*$ and η_x^* (the star means the value of a parameter at the interaction point).

The system starts by preparing with the help of PATMOD input data decks for QUADS and MICROSEX, i.e. target values of desired parameters. One option prepares a deck for a grid of 5x5 points in v_x, v_y space. The other option prepares five sets of five points. Each set of five points are increments in one of the five above-mentioned parameters (keeping all others fixed). These options are selected by means of the control code number KW(16).

Publications describing the code:

S. Kheifets, "Tracking Studies in PEP and Description of the Computer Code PATRICIA," in Proc. Workshop Orbit and Particle Tracking Programs at BNL, (1982) BNL informal report BNL 31761

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

unknown

Source language:

Computers it runs on:

It is available as: ☐ Source code, ☐ Executable only

Source Media: ☐ Listing, ☐ Tape, ☐ Diskette, ☐ Cards, ☐ Networks
☐ Tape format
☐ Diskette and/or format

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address:

Date of Latest Version: July 1986

Program Name: PAR2DOPT

Person to Contact: Gerry Morgan

Address: Brookhaven National Lab

Bldg 302B

Upton, Long Island, NY 11973

USA

Telephone Number: (516) 282-4841 FTS 666-4841

Classification of Computer Code:

Component Design:

☐ Ion Source, ☒ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron,

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

PAR2DOPT is used in the optimization of coil placement of circular cross section magnets of the type used in the design of SSC magnets. It optimizes the azimuthal position and tilt of layered turns and the number of turns per block. The layers of turns need not be fully keystoned, but can be shimmed with wedge-shaped material. The code can be run with or without infinite permeability iron surrounding the coils. The optimizer is based on the CERN code MINUIT. It has some Tektronics 4010 based graphics output. The code is still in the development stage and has no documentation.

Publications describing the code:

None. The authors of the present code include Richard Fernow, Gerry Morgan and Patrick Thompson. Shlomo Caspi at LBL has a copy.

Is code documentation available? ☐ Yes ☒ No

How may the code be obtained?

Call Gerry Morgan

Source language: FORTRAN

Computers it runs on: VAX, CDC 7600

It is available as: ☐ Source code, ☐ Executable only

Source Media: ☐ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format: whatever

Diskette: use A format

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address:

Date of Latest Version: Apr. 1985

Program Name: PARMELA

Person to Contact: Lloyd M. Young

Address: MS H817, Group AF-1

Los Alamos National Laboratory

Los Alamos NM 87545

USA

Telephone Number: (505) 667-1951, FTS 843-1951

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☒ Linac, ☐ Cyclotron, ☐ Synchrotron, ☒

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

PARMELA means Phase And Radial Motion in Electron Linear Accelerators. It is a variation of PARMILA that applies to standing wave electron linacs and transport lines. The user must supply the linac structure and the fields in the basic rf cell. Multiparticle tracking is done with space charge forces. The independent variable is time as opposed to distance along the beam line, which is used in the non version PARMILA. The code was written by Ken Craudall. The code will generate several types of input electron distributions. The output is a file of particle distribution in 6D phase space at the exit of each rf cell. There is a postprocessor called PARCGRAPH which will make "phase space scatter plots". The code is partially documented.

Publications describing the code:

None

Is code documentation available? ☐ Yes ☒ No

How may the code be obtained?

Contact Lloyd Young

Source language: FORTRAN

Computers it runs on: CDC7600, CRAY-1

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☒ Listing, ☐ Tape, ☒ Diskette, ☐ Cards, ☒ Network

Tape format: as desired

Diskette size & format: 5.25 IBM PC

Available through: ☐ DECNET, ☒ ARPANET, ☒ BITNET

Network Address: lby@land.lanl.gov

Date of Latest Version: Jan 1986

Program Name: PARMILA

Person to Contact: Los Alamos Accelerator Code Group
Address: MS H829, Group AF-6,
Los Alamos National Laboratory
Los Alamos, NM 87545
USA

Telephone Number: (505) 667-6677 or (2839) FTS 943-6677

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☒ Linac, ☐ Cyclotron, ☐ Synchrotron, ☒ transport lines

Tracking or Simulation:

☒ Linac, ☐ Cyclotron, ☐ Synchrotron, ☒ transport lines

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

PARMILA means Phase And Radial Motion in Ion Linear Accelerators. Given the electric and magnetic fields in one rf cavity and the gap-length-to-cell length function for the cavity design from a code like SUPERFISH, PARMILA will generate the layout for a multicell DTL. It also does multiparticle tracking with space charge through the linac or through a transport line. There are several choices of input particle distributions: KV, Gaussian, waterbag, uniform, rectangular and experimental data. The default space charge subroutine assumes a circular beam and makes the impulse approximation once per rf cell. Other subroutines can be substituted if desired. The output is a file with the phase space distribution at the exit of each rf cell. There is a postprocessor called OUTPROC that will plot beam profiles as a function the beam direction z and particle distribution for cross sections of phase space, e.g. (x, x') , (y, y') , $(p, \dots)$ etc. OUTPROC also calculates moments of the distribution. The code is partially documented.

Publications describing the code:

None

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

Contact: The Los Alamos Accelerator Code Group

Source language: FORTRAN

Computers it runs on: CDC7600, CRAY-1

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☒ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☒ Networks

Tape format: Crack 1600 bpi

Diskette size & format:

Access mode through: ☐ DECNET, ☒ ARPANET, ☒ BITNET

Network Address: lks@lanl.gov

• Date of Latest Version: Jan. 1986 Program Name: PARMTEQ(B,C)

Person to Contact: The Los Alamos Accelerator Code Group
Address: MS H829, Group AF-6
Los Alamos National Laboratory
Los Alamos, NM 87545
USA

Telephone Number: (505) 667-6677 or -2839, FTS 843-6677

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☒ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☒ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

PARMTEQ is a version of PARMILA that will generate a design for an RFQ ion accelerator and also do multiparticle tracking with space charge through the linac. To do the design layout the program needs the output of two codes RFQIK and CURLY, described elsewhere. There are several types of input distributions available.

In PARMTEQ(B) Z (distance along the beam) is the independent variable. In PARMTEQ(C) time is the independent variable. The output is a file of particle distributions over 6D phase space at the end of each RFQ "cell". There is a post-processor called OUTPROC that will calculate moments, make phase space plots and beam profiles.

Publications describing the code:

None.

Is code documentation available? ☐ Yes ☒ No

How may the code be obtained?

Call The Los Alamos Accelerator Code Group

Source language: FORTRAN

Computers it runs on: CDC 3600, CRAY-1

It is available as: ☒ Source code, ☐ Executable only

source Media: ☐ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☒ Networks

Tape format: ☐ Track 1600 bpi in almost any format

Diskette size & format:

Available through: ☐ DECNET, ☒ ARPANET, ☒ BITNET

Network Address: lhc@land.lanl

Date of Latest Version: 1984

Program Name: PATH

Person to Contact: Los Alamos Accelerator Code Group
Address: MS H829, Group A1-6
Los Alamos National Laboratory
Los Alamos, NM 87545
USA

Telephone Number: (505) 667-6677 (or 667-2839), FTS 843-6677

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☒ Beam Transport

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

PATH is a group of computer programs for simulating charged particle beam transport systems. It was developed for evaluating the effects of some aberrations without a time-consuming integration of trajectories through the system. The beam transport portion of PATH is derived from the well-known program DECAY-TURTLE. PATH contains all features available in DECAY-TURTLE (including the input format) plus additional features such as a more flexible random-ray generator, longitudinal phase space, some additional beamline elements, and space-charge routines. One of the programs also provides a simulation of an Alvarez linear accelerator. The programs, originally written for a CDC 7600 computer system, also are available on a VAX/VMS system. All of the programs are interactive with input prompting for ease of use.

Publications describing the code:

John A. Farrell, "PATH - A Lumped Element Beam Transport Simulation Program with Space Charge," Proc. of Berlin Conf. on Computing in Accel. Design and Operation," W. Busse and R. Zehny, ed. Springer Verlag, Berlin (1984) 267.

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

Contact the Los Alamos Accelerator Code Group

Source language: FORTRAN

Computer it runs on: VAX, CDC 7600

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☐ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☒ Networks

Tape format: 9 Track 1600 bpi

Diskette size & format:

Available through: ☐ DECNET, ☒ ARPANET, ☒ BITNET

Network Address: lks@lanl.gov

Date of Latest Version: July 1986

Program Name: PATPET

Person to Contact: Helmut Wiedemann

Address: Stanford Synchrotron Radiation Laboratory
BIN #69
P.O. Box 4349,
Stanford, CA 94305

Telephone Number: (415) 497-2503, FTS 461-9300 ext. 2503

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☒ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

PATPET is a combination of PATRICIA and PETROS. It is a tracking program that takes into account multipoles, systematic field errors, and misalignments. It produces dynamic apertures in one run based on tracking 400 particles.

Publications describing the code:

Users Guide (draft)

Is code documentation available? ☐ Yes ☐ No

How may the code be obtained?

Contact Helmut Wiedemann

Source language: FORTRAN

Computers it runs on: VAX

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☐ Listing, ☐ Tape, ☒ Diskette, ☐ Cards, ☐ Networks

Tape format:

Diskette size & format: 8" Floppy

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address: RL70

Date of Latest Version: unknown

Program Name: PATRAC

Person to Contact: A. Hilaire

Address: LEP Theory Div
CERN
1211 Geneva 23
Switzerland

Telephone Number:

Classification of Computer Code:

Component Design:

Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

Linac, ☐ Cyclotron, ☒ Synchrotron, ☐

Analysis:

Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

PARTICLE TRACKING is a tracking program using a magnet matrix formalism for elements up to quadrupoles and thin lens approximation for multipoles up to 12 poles. The magnet matrices are similar to those used of the code ACS but have been extended to allow rotated magnets and hence coupled motions.

Publications describing the code:

P. Fougeras, A. Hilaire and A. Warman, 'PATRAC: Particle Tracking Program,' Proc. of Workshop on Accelerator Orbit and Tracking Programs, Brookhaven, Brookhaven National Laboratory Internal Report BNL 317 (1982)

Is code documentation available? ☐ Yes ☐ No

How may the code be obtained?

unknown

Source language:

Computer it runs on:

It is available as: ☐ Source code, ☐ Executable only

Source Media: ☐ Listing, ☐ Tape, ☐ Diskette, ☐ Cards, ☐ Networks
☐ Tape format

For file size & format

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address:

Date of Latest Version: unknown

Program Name: PATRICIA

Person to Contact: S. Chenets

Address: Stanford Linear Accelerator Center
Stanford, CA 94305
USA

Telephone Number:

Classification of Computer Code:

Component Design:

Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

Linac, ☐ Cyclotron, ☒ Synchrotron,

Analysis:

Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

The program does the following calculations: a) It adjusts horizontal and vertical chromaticities to the values prescribed by the user. b) It calculates Twiss parameters and eta functions of the lattice. c) It calculates emittances of the beam and relevant parameters of the ring. d) It performs harmonic analysis of the particle motion and produces its frequency spectrum. e) It tracks up to four particles simultaneously through up to one thousand revolutions. The oscillations in all three degrees of motion can be included into calculations, but horizontal and vertical motions are treated independently and coupling is taken into account besides that which appears from the passage of a displaced particle through a sextupole. In all these calculations usual (3x3) matrix formalism is used. Sextupoles are treated in thin lens approximation. PATRICIA does not fit parameters of a linear lattice. The program uses the lattice which is supplied to it and attempts to find a periodic solution for the Twiss parameters and the dispersion function. If no periodic solution can be found for the on-momentum particle, the program stops. To investigate the influence of higher multipole fields in different elements of a machine, an optional version of PATRICIA under the name PNWM can be used. The action of the nonlinear field in a given element is approximated by an effective integrated nonlinear "kick". The longitudinal position of the kick is at the discretion of the user.

Publication(s) describing the code:

Chenets, S. Tracking studies in PEP and Description of the Computer Code PATRICIA. SLAC
PUB 2909 & BNL 31761 (1982) 89.

Chenets, S. Studies of the Chromatic Properties and Dynamic Aperture of the BNL Colliding Beam
Accelerator. IEEE Trans. NS-30 (1983) 1469.

Is code documentation available? ☐ Yes ☐ No

How may the code be obtained?

unknown

source function: PA-CAL

Date of Latest Version: unknown

Program Name: PATTV

Person to Contact: John M. Jowett

Address: LEP Division

CERN

CH-1211 Geneva 23

Switzerland

Telephone Number: +0221 83 66 43 or 83 50 86

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☒ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☒ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

PATTV is a version of H. Wiedemann's PATRICIA program which has been used at CERN since 1982. The main modification of the program was to provide high quality graphics via the CERN GD3 package. It is possible to watch animated "movies" of the particle motion on a terminal screen. Some additional analysis of particle power spectra is included.

Publications describing the code:

J. M. Jowett, "A Method for Distinguishing Chaotic from Quasi-periodic Motions in Orbit Tracking Programs," in Computing in Accelerator Design and Operation, edited by W. Busse and R. Zebayry, Springer-Verlag, Berlin (1984) pp. 261-6.

J. M. Jowett, "A New IBM Version of the Program PATRICIA," CERN LEP Theory Note No. 1 (1982).

J. M. Jowett, "An easy way to run PATTV (PATRICIA)," CERN LEP Theory Note No. 16 (1983).

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

Contact J. M. Jowett

Source language: FORTRAN 77

Computer it runs on: IBM

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☒ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☒ Networks

Tape format:

Diskette size & format:

Available through: ☐ DEC ☐ LL ☐ ARPANET ☒ BITNET ☒ EARN ☐ 60

Network Address: JOWETT@CERNVM

Date of Latest Version: Oct 1985

Program Number: 1720

Person to Contact: John S. Whitney
Address: Vector Fields, Ltd
Osney Mead
Oxford OX2 0EE
England

Telephone Number: 0865 248236

Classification of Computer Code:

Component Design:

☐ Ion Source, ☒ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☒ trajectory calculations in 2D

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

PE2D is a 2D code for the analysis of magnetostatic or electrostatic fields and steady state and transient eddy currents. It can be used for a wide range of applications including fusion and accelerator magnets, electron beam lenses, non-destructive testing, actuators, and MRI magnet shielding.

PE2D enables the solution of the partial differential equation governing a system to be computed using the finite element method. The packaged pre-processor provides powerful tools to aid data input.

The design requiring analysis is defined as an assembly of simple primitives, for example curved four quadrilaterals, which are then automatically subdivided by the program. The simple primitives have symmetry properties and may be replicated by rotation, reflection and translation. Using these features together with the copy and modify facilities, it is easy to model even the most complex geometry.

The geometric primitives have assigned material properties. These may be material constants such as permeability, conductivity and current density. Material properties can be specified as tables of function values.

PE2D uses either first or second order triangular finite elements. The first order solution can be used to obtain a fast test of the model before solving to higher accuracy using second order elements.

There are three analysis programs provided with PE2D:

static fields (non linear and laminated materials)

transient fields (non linear)

steady state alternating current fields (linear)

The post processor provides extensive facilities for presentation and display of the results. These include potential, fields and forces.

Rate of the iteration analysis and display provide the user with information necessary for improving the input data to achieve the necessary accuracy in an economical way.

Publications describing the code:

N. J. Diserens, 'A Space Charge Beam Option For The PE2D And TOSCA Packages,' IEEE Trans
MAC-19 (1982) 362-366

Data Sheet Ref. 118522 from Vector Fields

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

By license agreement with Vector Fields, Ltd

Source language: FORTRAN 77

Computers it runs on: PRIME, VAX, IBM

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☐ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format: As required

Diskette size & format:

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

☒ DOE Network

Network Address: Contact Bob Lari - Argonne National Laboratory (312)972-6632

Date of Latest Version: Dec 1985

Program Name: PETROC

Person to Contact: Gilbert Guignard or Yolande Marti

Address: IEP Division
CERN
1211 GENEVA 23
Switzerland

Telephone Number: 41 22 83 59 75

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☒ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☒ Closed Orbit Distortion.

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

It computes betatron and dispersion functions, synchrotron frequency. It calculates the radiation integrals, darapng partition numbers, beam emittances, bunch length and energy spread. The effect of given or random distortions (misalignments) on the closed orbit and betatron motion is determined (with or without radiation losses). Different algorithms for correcting the orbit are included (amplitude minimization, successive bumps, iterative method using a small number of correctors).

Publications describing the code:

G. Guignard and Y. Marti, "PETROC Users' Guide," CERN Internal Report, CERN ISR BOM
TH 81.32

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

Contact G. Guignard or Y. Marti

Source language: FORTRAN 77

Computers it runs on: IBM

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☒ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☒ Networks

Tape format: Unlabeled tape, 1600 Bpi, 3200 char/block, 80 char/record

Diskette size & format:

Available through: ☐ DECNET, ☐ ARPANET, ☒ BITNET

Network Address: NAM00CERNVM

Date of Latest Version: unknown

Program Name: PETROS

Person to Contact: K. Steffen

Address: DESY

Notkestrasse 85

2000 Hamburg 52

Fed. Rep. Germany

Telephone Number:

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☐ RF-cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☒ Synchrotron, ☐

Analysis:

☒ Stability, ☐ Impedances, ☒ Orbit Correction

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

A computer program which simulates effects of possible error sources on the beam optics and the improvements due to orbit correction is a necessary tool for the study and design of large electron rings. Such a program called 'PETROS' exists at the DESY laboratory. PETROS can work in two modes: 1. Uncoupled transverse motions are assumed and the usual three-dimensional matrices are used in each plane. 2. Coupled transverse motions are considered and five-dimensional matrices are used throughout. It treats non-linear fields and effects of the radiation losses due to bending. It computes the linear transformation matrices of a ring structure, the corresponding betatron and dispersion functions, betatron and synchrotron frequencies. It calculates the five synchrotron radiation integrals, the damping partition numbers, the damping times, the length deviation of off-momentum orbits, beam emittances, bunch length, relative energy spread and synchrotron lifetime, the effect of prescribed or random distortions, taking into account the radiation losses due to bending. It simulates closed orbit corrections and gives the corresponding kick amplitudes.

Publications describing the code:

1. Steffen and E. Kewish, "Study of Integer-Difference Resonance in Distorted PETRA Optics," DESY-PET 76/09 (1976).

B. Jetter, "A Short Guide for the Use of Program PETROS at CERN," CERN report LEP 79/37 (1979).

C. Guignard and Y. Martin, "Numerical Simulations of Orbit Correction in Large Electron Rings," Proc. 1st Conference on Computing in Accelerator Design and Operation, Berlin 1983, Springer-Verlag, Berlin, Lecture Notes in Physics No. 215, (1983).

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

Unknown, seems to be available from DESY as PETROS and from CERN as PETROG.

Date of Latest Version: unknown

Program Name: PINWHEEL

Person to Contact: F. R. Close

Address: 1 Cyclotron Road
Lawrence Berkeley Laboratory
Berkeley, CA 94720
USA

Telephone Number: (415) 486-6166, FTS 451-6166

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☒ Cyclotron, ☐ Synchrotron, ☒ Spectrometer

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

PINWHEEL was used for tracking orbits of charged particles in a combined electric and magnetic field. Runge-Kutta integration is used to solve the first-order Hamilton's equations of motion. The program has 3 parts: control, plotting and integration.

Publications describing the code:

M. Reiser and J. Kopf, "Electrolytic Tank Facility and Computer Program for Central Region Studies for the MSU Cyclotron," Michigan State University report MSUCP-19 (1964)

F. R. Close, "PINWHEEL - Orbit Tracking in Combined Electric and Magnetic Fields," Lawrence Berkeley Laboratory Report LBL-BKY-PINWEL (1964)

John S. Colonius, "Particle Accelerator Design - Computer Programs," Academic Press, New York (1974) 246

Is code documentation available? ☐ Yes ☐ No

How may the code be obtained?

unknown, probably unavailable

Source language: FORTRAN IV

Computers it runs on: CDC 6600, 7600

It is available as: ☐ Source code, ☐ Executable only

Source Media: ☐ Listing, ☐ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format:

Diskette size & format:

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address:

Date of Latest Version: 1985

Program Name: PSCES

Person to Contact: Yoshitaka Iwashita

Address: Institute for Chemical Research

Kyoto University

Enri-cho, Awataguchi

Sakyo-ku, Kyoto 606,

JAPAN

Telephone Number: Unknown

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☒ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

A new code, PSCES, has been developed for calculating a complete set of rf electromagnetic modes in an axisymmetric cavity. The finite-element method is used with up to third order shape functions. Although two components are enough to express these modes, three components are used as unknown variables to take advantage of the symmetry of the element matrix. The unknowns are taken to be either the electric field components $\mathbf{E} = (E_r, E_\theta, E_z)$ or the magnetic field components $\mathbf{H} = (H_r, H_\theta, H_z)$. The zero divergence condition is satisfied by the shape function within each element.

Publications describing the code:

Y. Iwashita, "Calculation of RF Fields in Axisymmetric Cavities," Los Alamos National Laboratory report LAUR 85-1892

Is code documentation available? ☐ Yes ☒ No

How may the code be obtained?

Contact author

Source language: FORTRAN

Computers it runs on: VAX 780

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☐ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format:

Diskette size & format:

Available through: ☐ DE CNF-L, ☐ ARPANET, ☐ BITNET

Network Address:

Date of Latest Version: 1980

Program Name: F602.C2

Person to Contact: Program Library
Address: DD Div
CERN
CH - 1211 Geneva
Switzerland

Telephone Number: (22) 83 2377

Classification of Computer Code:

Component Design:

☐ Ion Source, ☒ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

Magnet design in 2 dimensions

Finite-element method, triangular mesh.

Also for various scalar potential distributions.

Publications describing the code:

CERN Program Library Writeup F602

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

CERN Program Librarian

Source language: FORTRAN 77

Computers it runs on: IBM CDC

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☐ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format: 9 track 1600 bpi

Diskette size & format

Available through: ☐ DFCNET, ☐ ARPANET, ☐ BITNET

Network Address:

Date of Latest Version: Nov. 1985

Program Name: POISSON GROUP PROGRAM

Person to Contact: Los Alamos Accelerator Code Group

Address: MS H829, Group CAF-61

Los Alamos National Laboratory

Los Alamos, NM 87545

USA

Telephone Number: (505) 667-9131 (or 667-2839) FTS 843-9131

Classification of Computer Code:

Component Design:

☐ Ion Source, ☒ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

Calculate static magnetic fields in two cartesian dimensions or cylindrically symmetric configurations in 3D. Will handle problems with permeable iron, but not permanent magnets. Can also solve electrostatic problems. Uses over relaxation method to solve 2D generalized Poisson equation. Included in the group of codes is AUTOMESH, LATTICE, FORCE, and MIRT. MIRT is an optimization code.

Publications describing the code:

K. Halbach: "A Program for Inversion of System Analysis and Its Application to the Design of Magnets," Proc. 2nd Conf. on Magnet Technology, Oxford, England, (1967)

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

Send blank tape to above address, specify version desired. VAX or CRAY

Also available through ARPANET, DECNET or BITNET. Telephone us for instructions.

Source language: FORTRAN 77

Computer: ATLAS or VAX/CRAY

How available as: ☒ Source code, ☐ Executable only

source Media: ☐ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☒ Networks

Tape format: ☐ Crk 1600 bpi

Diskette: ☐ crk 5 format

Available through: ☐ DECNET ☒ ARPANET ☒ BITNET

Notes on Address: See blank tape

Date of Latest Version: Oct. 86

Program Name: POISSON, 10/86

Person to Contact: R. C. Gupta

Address: Brookhaven National Laboratory
Building 902 B
Upton, NY 11973
U.S.A.

Telephone Number: (516)282-4805, FFS 666-4805

Classification of Computer Code:

Component Design:

Ion Source, ☒ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

Stability, ☐ Impedances, ☐

Other

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

POISSON-BNL is the modified version of the 1981 Los Alamos National Lab. version of the Poisson Group codes created by Holsinger and Halbach. Major modifications have been made in the AUTOMESH and LATTICE programs. The user now has more control over the type of mesh to be generated and one can use different mesh size at any number of places, anywhere in a model. These improvements allow one to describe the finer details of a complicated geometry with a reasonable number of mesh points. In POISSON one now has access to the intermediate results while the original run is progressing, for a better control of convergence. Also there is a lesser chance that a solution will diverge.

Publications describing the code:

R. C. Gupta, Modifications in the AUTOMESH and other POISSON Group Codes. Workshop on Electromagnetic Field Computation, Oct. 20-21, 1986. (To be published) (To be used in addition to the manual available from the Los Alamos Accelerator Code Group for the standard Poisson Group Codes.)

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

Contact R. C. Gupta

Source language: ☒ FORTRAN 77

Computer: ☐ Runs on VAX

Is it available as: ☒ Source code, ☐ Executable only

Source Media: ☐ Listing, ☐ Tape, ☐ Diskette, ☐ Cards, ☒ Networks

Tape format:

Diskette: ☐ 5.25 format

Available through: ☐ DECNET ☐ ARPANET ☒ BITNET

Network Address: BITNET: gupcabldag, DECNET: 1995, TELNET: RCDAG@BNL

Date of Latest Revision: 12/11/86

Program Name: POB100

Person to Contact: Casper

Address: MS 4000

Lawrence Berkeley Laboratory

1 Cyclotron Road

Berkeley, CA 94720

USA

Telephone Number: (415) 444-1141, 444-1244

Classification of Computer Code

Component Design:

Ion Source, ☐ Magnet, ☐ RF cavity,

Accelerator Optimization:

Lattice, ☐ Cyclotron, ☐ Synchrotron,

Tracking or Simulation:

Lattice, ☐ Cyclotron, ☐ Synchrotron,

Analysis:

Stability, ☐ Impedances,

Other:

Short Description: Purpose, capabilities, algorithms, special features, etc.

This is a generalization of the standard POISSON code which replaces simple constant Neumann (Dirichlet) boundary conditions by more general conditions expressible in the form of a series of harmonic functions giving the physically correct behavior of the potential at large distances. The code can handle the superposition of an externally applied field as well.

Although the original version was written for the HP1000, there exists a version which runs on the VAX/CRAY. Documentation exists for the original POISSON code; changes are described in the publications below.

Publication describing the code

Casper, M. Helm, and E. J. Laylett, "Incorporation of a Circular Boundary Condition into the Program POB100," Lawrence Berkeley Internal Report LBL-14964, UC-MAG-14964 (1984).

Casper, M. Helm, and E. J. Laylett, "The Generalization of a Circular Boundary Condition in the Program POB100 to include Axisymmetry and Axisymmetry of Revolution," Lawrence Berkeley Internal Report LBL-14963, UC-MAG-14963 (1984).

Casper, M. Helm, and E. J. Laylett, "Incorporation of an Elliptical Boundary Condition into the Program POB100," Lawrence Berkeley Internal Report LBL-15298, UC-MAG-15298 (1984).

Casper, M. Helm, and E. J. Laylett, "Incorporation of Superposition into the Program POB100," Lawrence Berkeley Internal Report LBL-14965, UC-MAG-14965 (1984).

Casper, M. Helm, and E. J. Laylett, "The Application of Program POB100 to Accelerator Design: Magnet static and Electrostatics with Use of Periodic, planar and Boundary Conditions," Lawrence Berkeley Internal Report LBL-15300, UC-MAG-15300 (1984).

Casper, M. Helm, and E. J. Laylett, "Incorporation of Boundary Conditions to Program POB100," Lawrence Berkeley Internal Report LBL-15301, UC-MAG-15301 (1984).

Casper, M. Helm, and E. J. Laylett, "Incorporation of a General Boundary Condition in the Program POB100," Lawrence Berkeley Internal Report LBL-15302, UC-MAG-15302 (1984).

1. Is code for distribution available? ☒ Yes ☐ No

How may the code be obtained?

☐ mail ☒ in person

Source language: FORTRAN

Computer: IBM 370 or 370/150 or 370/155

It is available as: ☐ Source code, ☒ Executable only

Source Media: ☐ Listing, ☒ Tape ☐ Diskette, ☐ Cards, ☐ Networks
☐ Tape format
☐ Diskette size & format

Available through: ☐ DECNET ☐ ARPANET ☐ BITNET

Network Address:

Date of Latest Version: Apr. 1986

Program Number: POISSON-FAC

Person to Contact: W. Schmidt or S. Pissanetsky

Address: Texas Accelerator Center
2400 Timberloch Place
The Woodlands, TX 77380
U.S.A.

Telephone Number: (713) 663-0121

Classification of Computer Code:

Component Design

Ion Source, X-Magnet, RF cavity,

Accelerator Optimization

Linac, Cyclotron, Synchrotron,

Tracking or Simulation

Linac, Cyclotron, Synchrotron,

Analysis

Stability, Impedances,

Other

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

This is a modification of the original POISSON code developed by Holsinger and Hallbach, where the magnetization table is accurately interpolated, table truncation errors are avoided, and data input is simpler. Imagine the field at a point in a magnet as given by the sum of contributions from each little element of magnetized iron, plus a contribution from the currents. The field can be accurately calculated only if the magnetization is accurately known at each point. In POISSON, the magnetization is calculated by interpolating a table with the assumption that μ is a linear function of B^2 in each interval. It is now known that such an assumption produces errors as large as 4% in some intervals of the POISSON internal table (1010 steel), which are larger than the experimental errors in the measurement of $\mu^{1/2}$. To solve this difficulty, a table with 195 points has been generated for 1008 steel using accurate interpolation techniques.² This table has been implemented as the internal table of POISSON-FAC. The points are so close that POISSON's assumption of $\mu \propto B^2$ does not introduce any appreciable errors, and good field accuracy can be obtained. POISSON-FAC will issue a warning when truncation of the magnetization table occurs as a consequence of high fields during iteration. It has been shown that convergence to an incorrect solution takes place when truncation errors are present.² However, if truncation appears only during the initial iterations and then stops, convergence is to the correct solution.

POISSON-FAC also has an improved data input scheme. POISSON-FAC is available for VAX and CDC, and documentation exists for the original POISSON code.

Publication describing the code

1. Pissanetsky, "The Interpolation of Magnetization Tables," COMPEL, 1986, 4(1).

2. Pissanetsky and Schmidt, "A New Magnetization Table for 1008 Steel," TAC Report, 1986, 10, 1. A more extensive report, TAC-87-01, is in preparation.

Is code stored in a format readable by a file? Yes

How many tapes are required? 1

Source: W. Schmidt or S. Pissanetsky

Source language: FORTRAN 77

Computers it runs on: VAX and VMS

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☐ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☐ Networks
Tape format:
Diskette size & format:

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address:

Date of Latest Version: Apr. 1986

Program Name: PROFI

Person to Contact: PROFI Engineering
Address: Wilhelminen-Strasse
D-6400
Darmstadt
Fed. Rep. Germany

Telephone Number: (06151) 28418

Classification of Computer Code:

Component Design:

Ion Source, ☒ Magnet, ☐ RF cavity, ☒ Electric machines

Accelerator Optimization:

Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

Linac, ☐ Cyclotron, ☐ Synchrotron,

Analysis:

Stability, ☐ Impedances,

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

The computer program PROFI (program for calculation of fields) which calculates 2- or 3-dimensional nonlinear magnetostatic fields, linear electrostatic or stationary electric fields, stationary non-linear 2-dimensional eddy current fields and stationary temperature distributions. The program uses the finite difference method. The calculations may be carried out in one of five different coordinate systems, two of them being 3-dimensional. A set of service programs for preparing the input data, analysing the results, data handling etc. simplifies the use of the program.

Publications describing the code:

W. Müller et al.: Numerical Solution of 2- or 3D Nonlinear Field problems by means of the Computer Program PROFI - Archiv für Elektrotechnik 65 (1982) 299

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

This code can be bought from PROFI Engineering. Purchase also includes updates and some assistance in learning the code.

Source language: FORTRAN

Can source be run on: IBM S/VS C/PC

Is available as: ☒ Source code, ☐ Executable only

Source Media: ☐ Floppy, ☒ Tape, ☐ Diskette, ☐ Card, ☐ Network
Tape format: IBM S/VS standard
Diskette file format:

Available through: ☐ DECNET ☐ ARPANET ☐ BITNET

Get more info:

Date of Latest Version: unknown

Program Name: PRUD-M

Person to Contact: A. G. Dzykovsky

Address: Institute for High Energy Physics
Serpuukhov
USSR

Telephone Number:

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☒ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

A program package for calculating eigenfrequencies and electromagnetic fields with azimuthal variations in axial-symmetric cavities of an arbitrary shape. The method is based on the representation of the equations of electrodynamics in variables ϕ, θ, ρ, z . Apart from frequencies and fields, the accumulated energy, distribution of losses in the metal, and other characteristics important for application are also computed. The package offers wide possibilities for graphic representation of the field topology, facilitating the analysis, and optimization of complicated accelerating structures. The program works in two modes: a mode of estimating the frequency spectrum in the specified interval and a mode of accurate computation of a specific frequency, related fields and derived quantities.

Publications describing the code:

A. G. Dzykovsky, Y. I. Portugalov and A. D. Rynbov, "PRUD code for Calculation of the Nonsymmetric Modes in Axial-Symmetric Cavities," Part 1, *Accel.* 12 (1982) 59.

Abramov, A. G., Dzykovskij, A. G., Ershov, S. Yu., Portugalov, Ye. I., Portugalova, L. D., "Method to Find Eigen Electromagnetic Fields in Cavities of Arbitrary Shape. PRUD-M Program Package to Find Azimuthal Nonuniform modes in Axial-Symmetric Cavities. Part 2," Gosudarstvennyi Komitet po Ispol'zovaniyu Atomnoi Energii SSSR, Serpukhov Inst. Fiziki Vysokikh Energii, Report No. IFEV-OMV-F-80-17-0 (1983), in Russian.

Is code documentation available? ☐ Yes ☐ No

How may the code be obtained?

unknown

source language:

Computers it runs on:

It is available as ☐ Source code, ☐ Executable only

source Media: ☐ Listing, ☐ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

☐ Tape format

☐ Diskette size & format

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address:

Date of Latest Version: unknown

Program Name: PRUD-O

Person to Contact: A. G. Abramov

Address: Institute for High Energy Physics
Serpuukhov
USSR

Telephone Number:

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☒ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

A program package intended for calculating azimuthal-symmetric modes in axisymmetric cavities as well as critical modes in longitudinally uniform waveguides. The discretization of electrodynamics equations uses eight-node quadrilateral isoparametric elements. The block power method for solving algebraic eigenvalue problems including estimations of convergence rate is used. To illustrate performance of the program and its separate units and estimate the accuracy, counting time, possibility of calculation oscillations with multiple eigenvalues, the program has been checked on problems having analytical solutions: oscillations in spherical and cylindrical resonators, waves in a rectangular waveguide. It is concluded that frequency by the PRUD-O program is more accurate than by the SUPERFISH program by approximately two orders.

Publications describing the code:

Abramov, A. G., Dapkovskiy, A. G., Ershov, S. Ye., Portugalov, Yu. I., Ryabov, A. D., "PRUD-O Program Package for Accelerating Structure Calculation," Gosudarstvennyi Komitet po ispol'zovaniyu Atomnoy Energii, Report No. IEVE-OMVT-83-3 (1983), in Russian.

Is code documentation available? ☐ Yes ☐ No

How may the code be obtained?

unknown

Source language:

Computers it runs on:

It is available as ☐ Source code, ☐ Executable only

Source Media: ☐ Listing, ☐ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

☐ Tape format

☐ Diskette size & format

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address:

Date of Latest Version: unknown

Program Name: PRUD-OB

Person to Contact: A. G. Abramov

Address: Institute for High Energy Physics
Serpukhov
USSR

Telephone Number:

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☒ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

The PRUD-OB program package is intended for calculating the azimuthally homogeneous modes in accelerator periodic axially-symmetrical systems. The problem is reduced to determination of two real functions for the structure half-period. The package is oriented for the problems of determining the periodic structure dispersion characteristics.

Publications describing the code:

Abramov, A. G.; Dajkovskij, A. G.; Portugalov, Yu. I.; Ryabov, A. D., "Modification of the PRUD-OB Program Package for Calculating the Periodic Structures," Gosudarstvennyi Komitet po Ispol'zovaniyu Atomnoi Energii SSSR, Serpukhov, Inst. Fiziki Vysokikh Energii, Report No. IFVE-OMVT-83-178 (1983), in Russian

Is code documentation available? ☐ Yes ☐ No

How may the code be obtained?

unknown

Source language:

Computers it runs on:

It is available as: ☐ Source code, ☐ Executable only

Source Media: ☐ Listing, ☐ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format:

Diskette size & format:

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address:

Date of Latest Version: unknown

Program Name: RACETRACK

Person to Contact: A. Wulich

Address: DESY

Notkestrasse 85

2000 Hamburg 52

Fed. Rep. Germany

Telephone Number:

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☐ RF-cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☒ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☒ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

RACETRACK is a computer code to simulate transverse nonlinear particle motion in accelerators. Transverse magnetic fields of higher order are treated in thin magnet approximation. Multipoles up to 20 poles are included. Energy oscillations due to the nonlinear synchrotron motion are taken into account. Several additional features, as linear optics calculations, chromaticity adjustment, tune variation, orbit adjustment and others are available to guarantee a fast treatment of nonlinear dynamical problems.

Publications describing the code:

A. Wulich, "RACETRACK - A Computer Code for the Simulation of Nonlinear Particle Motion in Accelerators," DESY Internal Reports 84/07 and 84/028 (1984).

Is code documentation available? ☐ Yes ☐ No

How may the code be obtained?

unknown

Source language: unknown

Computers it runs on:

It is available as: ☐ Source code, ☐ Executable only

Source Media: ☐ Listing, ☐ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format:

Diskette size & format:

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address:

Date of Latest Version: 1986

Program Name: 2D

Person to Contact: P. Spadtke

Address: GSI

Postfach 11 05 31

6100 Darmstadt

Fed. Rep. Germany

Telephone Number: 06151-459-423

Classification of Computer Code:

Component Design:

☒ Ion Source, ☐ Magnet, ☐ RF cavity, ☒ Electron gun

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron,

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☒ Beam transport lines

Analysis:

☐ Stability, ☐ Impedances,

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

Simulation of ions, electrons within electrostatic, magnetostatic fields. Electrostatic potentials are calculated exactly, interactively. Menu-driven program. Including high resolution colored graphics. 2D code. Cylindrically symmetric.

Publications describing the code:

Presentation on low energy ion beams. Conference in GB 1986

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

On request

Source language: Machine Language

Computers it runs on: Commodore C64, C128

Is it available as: ☐ Source code, ☒ Executable only

source Media: ☐ Listing, ☐ Tape, ☒ Diskette, ☐ Cards, ☐ Network

File format:

Diskette size & format: 5.14 MB DD

Available through: ☐ DECNET ☐ ARPANET ☐ BITNET

Network Address:

Date of Latest Version: 1986

Program Name: RAYTRACE

Person to Contact: Stanley Kowalski
Address: Laboratory of Nuclear Science
Bldg. 26-505
MIT
Cambridge, MA 02139
USA
Telephone Number: 617/253-4288

Classification of Computer Code

Component Design:

☐ Ion Source, ☐ Magnet, ☐ RF cavity,

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron,

Tracking or Simulation:

☒ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

RAYTRACE is an ion optical computer code, which numerically integrates the particle differential equations of motion through real fields and can be used to trace rays one by one through a sequence of electromagnetic devices. The main types of elements that are presently supported include dipoles (6 versions), multipoles (4 through 12 poles), electrostatic deflector, velocity filter, lens, and solenoid. For an ion-optical system with a symmetry plane, the accuracy of the trajectory calculations in this plane is comparable to the accuracy of the description of the electric and magnetic fields, i.e., RAYTRACE computes to essentially infinite order. The field components for trajectories off this median plane for dipoles are described by a fourth order Taylor series; off axis in multipoles the field is described by a Taylor series carried to at least fifth order.

Users of RAYTRACE practically always start with TRANSPORT to determine first and second order parameters -- in other words the basic layout of the system. RAYTRACE is then used to fine tune the system. First and second order parameters generally have to be readjusted slightly, and when dipoles are involved there are also zeroth order adjustments, i.e., centerline offsets. The major function of RAYTRACE, however, is to calculate higher order aberrations in the optics, and to aid in correcting these aberrations, whenever possible. The program does not have a built in automatic fitting routine for minimizing image aberrations, etc., but it has been used as a subroutine for such programs.

Since the program traces one ray at a time, it is not readily adaptable to handle space charge forces, as they occur in systems with intense beams.

Publications describing the code

1. Kowalski and H. A. Fuge, "RAYTRACE", Proc. of Second Int. Conf. on Charged Particle Opt., Albuquerque (1986) to be published. Also there is a MIT internal report.

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

1. Call for Manual: Accelerator Code Group, MIT, P.O. Box 33 National Laboratory, Cambridge, MA 02139, (617) 253-8760, you can also contact Stanley Kowalski directly.

Source language: FORTRAN

Computers it runs on: VAX

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☐ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☒ Networks

Tape format: 9 track, 1600bpi

Diskette size & format:

Available through: ☐ DECNET, ☒ ARPANET, ☒ BITNET

Network Address: hks@lanl.arpa or sk@mit.his

Date of Latest Version: Oct. 1985

Program Name: REFAX3D

Person to Contact: Corrie Kost

Address: Trumf

1004 Westbrook Mall

Vancouver, B.C.

Canada V6T 2A3

Telephone Number: 604-2221047 ext. 310

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☐ RF cavity, ☒ Electrostatic devices

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

User friendly interactive program which solves the Laplace-Poisson equation in 3D Cartesian or 2D cylindrical coordinate system with dielectrics (2D only) by the method of successive over relaxation (finite difference). Problem cases are dynamically loaded from a user-written subroutine describing the geometry. Contour plots of the potential distribution along any slice can be produced.

Publications describing the code:

H. Houtman, C. E. Kost, "A FORTRAN Program (REFAX3D) to Solve the 3-Dimensional Poisson (Laplace) Equation", Proc. EPS Conf. on Computing in Accelerator Design and Operation, Berlin 1983, Springer Verlag (1984)

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

Contact Corrie Kost

Source language: FORTRAN

Computers it runs on: VAX

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☐ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format: BACKUP

Diskette size & format:

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address:

Date of Latest Version: Nov. 1985

Program Name: REVMOC

Person to Contact: Carrie Kost

Address: Trumf

1004 Westbrook Mall

Vancouver, B.C.

Canada V6T 2A3

Telephone Number: 604-2221647 ext. 310

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☒ beam line transport

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

Second-order Monte Carlo beam transport program which includes the effects of multiple scattering, decay, nuclear scattering, and energy loss. The program cannot optimize beam line elements and is thus primarily used to do detailed checks on a TRANSPORT designed beam line. Aberration coefficients (transfer matrices) can be calculated for the full beam line.

Publications describing the code:

C. E. Kost, P. A. Reeve, "A Monte Carlo Beam Transport Program, REVMOC," Proc. EPS Conference on Computing in Accelerator Design and Operation, Berlin, 1983, Springer Verlag (1984)

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

Contact Carrie Kost

Source language: FORTRAN

Computers it runs on: VAX

It is available ~~as~~: ☒ Source code, ☐ Executable only

Source Media: ☐ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format: BACKUP

Diskette size & format:

Available through: ☐ DECNET ☐ ARPANET, ☐ BITNET

Network Address:

Date of Latest Version: Jan 1986

Program Name: RFQLIB

Person to Contact: Walter P. Lysenko

Address: MS H829, Group AF 6

Los Alamos National Laboratory

Los Alamos, NM 87545

USA

Telephone Number: (505) 667-7431

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☒ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

The RFQLIB system does particle tracing simulations for RFQ linear accelerators. The particle equations of motion are numerically integrated using time as the independent variable. The forces on the particles are computed in two subroutines. Subroutine FOR computes the external electric forces of the rf field in the RFQ. The RFQ parameters are stored in a table as a function of the longitudinal coordinate. Interpolation is used to get the parameters at given values of the synchronous particle position. Subroutine SCFOR computes the space charge forces by a particle-in-cell method using the electrostatic approximation. An r-z Poisson solver is used with a conducting boundary at r=const and with periodic boundary conditions in the z direction.

Publications describing the code:

W. P. Lysenko, "An RFQ Simulation Code" in Proc. of 1984 Linear Accel. Conf., ed. by N. Angert GSI 84-11 (1984) 327

See also LANL Informal Report AF6-ATN 84-1

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

Call Walter Lysenko.

Source language: FORTRAN

Computers it runs on: CRAY

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☐ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☒ Networks

Tape format: whatever

Diskette size & format:

Available through: ☒ DECNET, ☒ ARPANET, ☒ BITNET

Network Address: WPL@LANL on ARPANET

Date of Latest Version: Jan 1985

Program Name: JACOBI

Person to Contact: Kazuo Bozoki

Address: S. L. Dept.

Brookhaven National Laboratory

Upton, NY 11973

U.S.A.

Telephone Number: (516) 382-4701, FRS 666-4701

Classification of Computer Code:

Component Design:

Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

Linac, ☐ Cyclotron, ☒ Synchrotron, ☐

Tracking or Simulation:

Linac, ☐ Cyclotron, ☒ Synchrotron, ☐

Analysis:

Stability, ☐ Impedances,

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

It is a modeling program, which can be used

1) offline as a design program (like e.g. SYNCH, MAD, etc.) or

2) online as a control program. (When used as a control program, the program/microprocessor interface is specific to the installation.)

It has two major modules: one for

1) time and chromaticity optimization control, and one for

2) orbit calculation/correction control (It uses the MICADO algorithm for minimizing the orbit misplacements around the ring).

In addition to the standard lattice elements (drift, bend, quadrupole, sextupole) modulators can also be included. Edge focusing is calculated as in FRANKFORTH. Chromaticity due to dipoles is calculated as in SYNCH.

Machine and beam parameters, synchrotron integrals, damping partitions, rate of change of damping partitions, energy spread, spatial beam size, with and without coupling, bunch length, quantum and synchrotron lifetime, etc. are calculated on demand.

Publications describing the code

1) K. Bozoki, "High Level Control Programs at S. L. for on-line computing in Accelerator Systems", in "Operation 1983", Springer-Verlag (1984) 1-9.

2) Brookhaven National Laboratory internal report no. BNL-TH-364 (1985).

3) Brookhaven National Laboratory internal report no. BNL-TH-366 (1984).

For code documentation, consultable at: Argonne, Ill.

How may the code be obtained?

Contact Fwz Bozoki

Source language: FORTRAN

Computers it runs on: DG

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☐ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☐ Networks
Tape format:

Diskette size & format:

Available through: ☐ DECNET, ☐ ARPANET, ☒ BITNET

Network Address:

Date of Latest Version: May 1980

Program Name: CRY

Person to Contact: Bruce Carlsten

Address: MS HS-7, Group A1-7

Los Alamos National Laboratory

Los Alamos, NM 87545

USA

Telephone Number: (505) 667-4447 FAX 505/667

Classification of Computer Code

Component Design:

Ion Source, ☐ Magnet, ☐ RF cavity, ☒ Klystron simulations

Accelerator Optimization:

Linac, ☐ Cyclotron, ☐ Synchrotron,

Tracking or Simulation:

Linac, ☐ Cyclotron, ☐ Synchrotron,

Analysis:

Stability ☐ Impedances,

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

Ring model, time as the independent parameter. 3-D large signal beam/cavity interaction simulations, use of so called "dynamic wavelength" to ensure self-consistent particle motion, iterations to ensure self-consistent cavity gap voltages and space charge.

Publications describing the code:

P. Tallone and B. Carlsten - "Computer Modeling the Klystron" IEEE Trans. on Nucl. Sci. NS-29 (1982) 1140

P. Tallone and B. Carlsten - "3-D Consistent Klystron Simulations" IEEE Trans. on Nucl. Sci. NS-30 (1983) 1500

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

Contact Bruce Carlsten

Source language: FORTRAN

Operating system: IBM

Does it require any ☒ source code, ☐ documentation onlySource Media: ☐ Taping, ☒ Tape, ☐ Diskette, ☐ Card, ☐ Network,

Language used: A, C, and

BASIC, Pascal, Visual

Available on comp. DEC VAX ☒ ARPANET ☒ BITNET

Submitting Agency:

Date of latest Version: 1984	Program Name: SATED
Person to Contact: Gregory McNeill Address: Oak Ridge National Laboratory Building 4800N Oak Ridge, TN 37831-6138 U.S.A.	
Telephone Number:	
Classification of Computer Code: Component Design: Ion Source, ☒ Magnet, ☐ RF cavity, Accelerator Optimization: Linac, ☒ Cyclotron, ☐ Synchrotron, Tracking or Simulation: Linac, ☐ Cyclotron, ☐ Synchrotron, Analysis: Stability, ☐ Impedances, Other:	
Short Description: (Purpose, capabilities, algorithms, special features, etc.) SATEDSK calculates the median plane magnetic field due to fully saturated iron poletips. Optionally SATEDSK calculates the magnetic field due to disks of magnetic charge, which can simulate the effect of holes in the iron poletips or cylindrical iron rods embedded in the poletips. SATEDSK is intended for pole tip geometries that are both symmetric about the median plane, and have azimuthal sector symmetry. Thus, the program is primarily designed to simulate the magnetic field due to iron poletips in superconducting cyclotrons.	
Publication: (describing the code) Gregory & McNeill, "A 3-D, 4-A Nonlinear Simulation of the Magnetic Field Due to saturated Iron in a Cyclotron Poletip", Computer Phys. Comm. 23(1981)199.	
Is code documentation available? ☒ Yes ☐ No	
How may the code be obtained? CEC Program Library, Queen's University of Belfast, N. Ireland. Catalogue number: ABLE1	
source language: FORTRAN	
Computer Architecture: IBM 360-91	
How can one obtain the source code? ☐ In extensible form	
Transfer Media: ☐ Tape ☐ Tape ☐ Diskette ☐ Card ☐ Network	
Transfer cost:	
Transfer cost per unit:	
Access cost: ☐ 0.00 £/1 ☐ 0.00 £/1 ☐ 0.00 £/1	
Access cost: ☐ 0.00 £/1	

Date of latest version: 01/01/85 Program Name: SPACCH

Person to Contact: Robert J. Hayden
 Address: University of Montana
 Physics Department
 Missoula, MT 59812
 U.S.A.

Telephone Number: (406) 441-7073

Classification of Computer Code:

Component Design

☒ Ion Source, ☐ Magnet, ☐ RF cavity, ☒ Charge Exchange Solenoids

Accelerator Optimization

☐ Linac, ☐ Cyclotron, ☐ Synchrotron,

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron,

Analysis

☒ Stability, ☐ Impedances,

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

The code traces macrofilaments or macroparticles through electromagnetic fields with or without space charge. Fields may be analytical or tabulated grid values. Input options for the particle distribution include: measured, 1-Vol, 4-Vol, or 6-Vol, in phase space.

Publications describing the code:

R. J. Hayden and M. E. Jakobson, "The Space Charge Computer Program (SHARP)", IEEE Trans. Nucl. Sci. NS-30(1983):2740.

R. J. Hayden and M. E. Jakobson, "Macrofilament simulation of High Current Beam Transport", IEEE Trans. Nucl. Sci. NS-34(1987):149.

M. E. Jakobson and R. J. Hayden, "Proc. of Ion Optics Conf." (May 1986) To be published in Nucl. Instr. & Meth.

Is code documentation available? ☐ Yes, ☒ No

How may this code be obtained?

Contact Prof. Hayden or Prof. Jakobson at above address.

Computer language: ~~FORTRAN~~ FORTRAN

Computer: CRAYSON, VAX

Is code available as: ☐ Source code, ☐ Executable only

Source Media: ☐ Diskette, ☒ Tape, ☐ Dr. Kette, ☐ Cards, ☐ Network,

Time to execute: 0.001 CPU/CHARACT

Dr. Kette: none reported

Availability: ☐ Local, ☐ Regional, ☐ National, ☐ International

Notes: A tape

(Documentation is in the form of comment lines in the program.)

Date of Latest Version: Apr. 1986

Program Name: SCOP

Person to Contact: Ingo Hofmann

Address: GSI

Postfach 110541

D-6100 Darmstadt-11

Fed. Rep. Germany

Telephone Number:

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☒ Linac, ☐ Cyclotron, ☒ Synchrotron, ☒ Storage Rings

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

A 2D (x-y Cartesian) PIC code used for space-charge dominated beam transport studies. Recently used for studies of resonance crossing in storage rings under space-charge-dominated conditions. 2D trajectories, tracking.

Publications describing the code:

1. Bozsik and Ingo Hofmann, "Space Charge Effects in the Focusing of Intense Ion Beams," Nucl. Inst. Meth. 187 (1981) 305-311.

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

Source language: FORTRAN

Computers it runs on: IBM 3090

It is available as: ☒ Source code, ☐ Executable only

source Media: ☐ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☒ Networks

Tape format:

Diskette size & format:

Available through: ☐ DECNET, ☒ ARPANET, ☒ BITNET

Network Address: not given

.

Date of Latest Version: Apr. 1986

Program Name: SCOP (2)

Person to Contact: Ingo Hofmann

Address: GSI

Postfach 110541

D-6100 Darmstadt-11

Fed. Rep. Germany

Telephone Number:

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☒ Linac, ☐ Cyclotron, ☒ Synchrotron, ☒ Storage Rings

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

A-particle-in-cell simulation code with 3D trajectories and a 2D Poisson solver (r-z). Conducting cylindrical pipe as boundary condition. A user-defined impedance can be included. Code has been used to study rf bunching and the longitudinal microwave instability.

Publications describing the code:

I. Hofmann and I. Boszik, Proc. of the Symposium on Accelerator Aspects of Heavy Ion Fusion, GSI Darmstadt (1982) 181.

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

Write to Ingo Hofmann

Source language: FORTRAN 77

Computers it runs on: IBM 3090 and CRAY

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☐ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☒ Networks

Tape format:

Diskette size & format:

Available through: ☐ DECNET, ☒ ARPANET, ☒ BITNET

Network Address:

Date of Latest Version: Aug. 1985

Program Name: SHRIMP

Person to Contact: Robert Ryne, Robert Gluckstern
Address: Dept. of Physics and Astronomy
University of Maryland
College Park, MD 20742
USA

Telephone Number: (301) 454-7476

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☒ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

SHRIMP is a post-processor to the program SUPERFISH. SHRIMP computes the cavity frequency by a variational technique, using the fields calculated by SUPERFISH. The frequency computed by SHRIMP has an error $\delta f/f \propto 1/N^2$ (for an $N \times N$ mesh). Thus, by using SHRIMP as a post-processor, one can make the SUPERFISH mesh coarser, and still obtain comparable accuracy in f .

Publications describing the code:

R. L. Gluckstern, R. D. Ryne, R. F. Holsinger, "Numerical Programs for Obtaining Accurate Resonant Frequencies of Modes in Azimuthally Symmetric Electromagnetic Cavities," Proceedings of the COMPMAG Conference, Genoa, Italy, IEEE Trans. MAG-19 (1983) 141

Is code documentation available? ☐ Yes ☒ No

How may the code be obtained?

It is located in MASS under 005680.5.5. SHRIMP (at Los Alamos National Laboratory). Contact the Los Alamos Accelerator Code Center (305) 667-6677 (or 667-2839), FTS 843-6677

Source language: FORTRAN

Computers it runs on: CRAY

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☐ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format: 906k, 1600 bpi

Diskette size & format:

Available through: ☐ DECNET, ☒ ARPANET, ☒ BITNET

Network Address: lks@thud.apa

Date of Latest Version: Apr. 1982

Program Name: SIMTRAC

Person to Contact: Daniel Brandt
Address: LEP Div
CERN
1211 Geneva 23
Switzerland

Telephone Number:

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☒ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☒ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☒ Wakefield Effects

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

SIMTRAC is a simulation program for tracking longitudinal and transverse single bunch effects in a circular electron machine for a number N of superparticles. The program includes damping, collective effects such as transition, beam-loading of rf cavities and wakefields. For a typical run 1000 superparticles can be followed for around 5000 turns. Output includes beam dimensions every NREPR turns, phase space plots, bucket contours, and averages over a given number of turns.

Publications describing the code:

D. Brandt, "SIMTRAC - A Simulation program for Tracking Longitudinal and Transverse Single Bunch Effects," CERN internal report LEP Note 512, 15 (1984)

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

Contact Daniel Brandt

Source language: FORTRAN

Computers it runs on: IBM

It is available as: ☐ Source code, ☐ Executable only

Source Media: ☐ Listing, ☐ Tape, ☐ Diskette, ☐ Cards, ☐ Networks
Tape format:
Diskette size & format:

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address:

Date of Latest Version: Apr. 1986

Program Name: SLAY

Person to Contact: Gerhard Rudolf
Address: SIN
CH-5234 Villigen,
Switzerland

Telephone Number: 0561 89 4394

Classification of Computer Code:

Component Design:

Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

Linac, ☒ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

Linac, ☒ Cyclotron, ☐ Synchrotron, ☒ Magnets

Analysis:

Stability, ☐ Impedances,

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

Orbit calculations from magnetic field measurements, processing of magnetic field measurements in cylindrical coordinates

Publications describing the code:

IV Int. Conf. on Isochronous Cyclotrons, Gathinburg, TN, IEEE NS-13, (1966) 194-214

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

Write to Gerhard Rudolf, SIN

Source language: FORTRAN 77

Computers it runs on: VAX, CDC, NOSVE

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☐ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format: 80 char./line, 10 lines/block

Diskette size & format:

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address:

Date of Latest Version: 1985

Program Name: SLIM

Person to Contact: Louis Hand

Address: Newman Laboratory of Nuclear Science
Cornell University
Ithaca, NY 14853
USA

Telephone Number: (607) 255-6023 (or 1000)

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☒ Synchrotron,

Analysis:

☒ Stability, ☐ Impedances, ☒ depolarization

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.) ☒

SLIM is a tracking code which includes spin-orbit interaction to calculate the depolarization of polarized beams due to closed-orbit distortions caused by misalignments. It uses an 8x8 matrix formalism, and includes effects of radiation damping. Stability is determined by looking at the eigenvalues of the total transport system.

There exists documentation for the 1984 version of the code as written by Alex Chao, but it is unknown whether D. Barber or L. Hand have updated the documentation.

Publications describing the code:

A. W. Chao, "Evaluation of Beam-Distribution Parameters in an Electron Storage Ring," J. Appl. Phys., 60 (1979) 795.

A. W. Chao, "Evaluation of Radiative Spin Polarization in a Electron Storage Ring," Nucl. Inst. Meth. 180 (1981) 29.

A. W. Chao, "Calculation of Polarization Effects," Computing in Accelerator Design and Operation, Proc. of 1983 Berlin Conf., Springer-Verlag, Berlin, (1984) 39.

H. Maier and G. Ripken, DESY report 83-062 (1983).

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

Desmund E. Barber, DESY, Notkestrasse 85, D-2000 Hamburg 92, Fed. Rep. Germany

Louis Hand, Cornell Univ., Ithaca, NY 14853 (607) 255-6023 (or 1000)

source language: FORTRAN.

.

. Computers it runs on: C/C++ IBM

It is available as: ☐ Source code, ☐ Executable only

Source Media: ☐ Listing, ☐ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format:

Diskette size & format:

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address:

Date of Latest Version: Mar 1982

Program Name: SNOW

Person to Contact: James P. Brannard
Address: Org 2564 Building 891
Sandia National Laboratory
Albuquerque, NM 87185
USA

Telephone Number: (505) 844-6462 FTS 532-6462

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

A digital computer program, SNOW, has been developed for the simulation of dense ion beams. The program simulates the plasma expansion cup (but not the plasma source itself), the acceleration region, and a drift space with neutralization if desired. The ion beam is simulated by computing representative trajectories through the device. The potentials are simulated on a large rectangular matrix array which is solved by iterative techniques. Poisson's equation is solved at each point within the configuration using space charge densities computed from the ion trajectories combined with background electron and/or ion distributions. (Note that some changes have been made in the code recently that have not been documented. It may be difficult to run the code without personal help from Brannard. Jack Boers is presently writing a new version of the code.)

Publications describing the code:

Jack E. Boers, "SNOW - A Digital Computer Program for the Simulation of Ion Beam Devices," Sandia Laboratory Internal Report no. SAND-69-1026 (1980)

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

Contact John Brannard at the above address or Jack Boers, Varian Corp., Gloucester, MA 01930. Phone (617) 981-2000 ext. 4344

Source Language: FORTRAN 77

Computer it runs on: CRAY XAY

How available as: ☒ Source code, ☐ Executable only

Source Media: ☐ Printing, ☒ Tape, ☐ Diskette, ☐ Cards, ☐ Network
☐ Tape format
☐ Diskette (size 2) format

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Access Address:

Date of Latest Version: unknown

Program Name: SOERM

Person to Contact: E. R. Close

Address: 1 Cyclotron Road
Lawrence Berkeley Laboratory
Berkeley, CA 94720
CSE

Telephone Number: (415) 486-6166; FRS: (415) 6936

Classification of Computer Code:

Component Design:

Ion Source, Magnet, RF cavity, etc.

Accelerator Optimization:

Linac, Cyclotron, Synchrotron,

Tracking or Simulation:

Linac, Cyclotron, Synchrotron, X-Ray Beam Transport

Analysis:

Stability, Impedances,

Other: Generate transport matrices from fields

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

In the design of beam transport systems, it is often desirable to generate transformation elements from a magnetic field by numerically integrating the orbits through the field. Such a transformation matrix is needed when only a measured field is available or when the effect of various trial magnetic fields is being investigated. Essentially, program SOERM produces first- and second-order elements when an arbitrary magnetic field is given. The resulting transformation matrix is readily applicable to beam transport programs such as TRANSPORT.

SOERM formulates a system of equations which, when integrated, produces the coordinates of the reference particle and of any nearby particle(s) specified. Once this is completed, the program calculates (if requested) the first- and second-order transformation matrix elements using the reference orbit as the origin in a suitably chosen coordinate system.

Publications describing the code

E. R. Close, "SOERM - A Program to Generate First- and Second-Order Matrix Elements by Tracking Charged Particles in a Specified Magnetic Field," Lawrence Berkeley Laboratory Report LBL-19503 (1979).

E. R. Close, "Generation of First- and Second-Order Transformation Elements from a Given Magnetic Field," *Inst. Methods*, 9(1), 69-70.

C. H. G. Colomas, "Particle Accelerator Design: Computer Programs," Academic Press, New York (1974), 194.

Is code documentation available? Yes

How many times code has been shipped?

unknown

Source language: FORTRAN

Computers it runs on: CDC 6600, 6700

It is available as: ☐ Source code, ☐ Executable only

Source Media: ☐ Listing, ☐ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format:

Diskette size & format:

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address:

1. Date of Entry: November 1, 1979 Program Name: EPOCH

Person to Contact: Comp. List

Address: RFLME
100 Westbrook Mall
Cambridge, BC
Canada V6L 2A3

Telephone Number: (604) 273-1041 ext. 310

Classification of Computer Code:

Component Design:

Ion Source, Magnet, RF cavity,

Accelerator Optimization:

Linac, Cyclotron, Synchrotron,

Tracking or Simulation:

Linac, Cyclotron, Synchrotron, X Beam Line

Analysis:

Stability, Impedances,

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

Calculates and plots the rms beam envelopes of a continuous non-relativistic proton beam through various elements (magnetic and electrostatic). Space charge forces are included. Either the generalized Kapchinsky-Vladimirov (K-V) equations or those of Engh are used.

Publications describing the code:

TRD-ME-76en0005 TRD-N-7311 TRD-N-7413 TRD-N-7432

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

Contact Comp. List

Source Language: FORTRAN

Computer: ATOM-600/333

Is code available as: ☒ Source code ☐ Executable only

Source Media: ☐ Listing, ☒ Tape ☐ Diskette ☐ Card ☐ Network

File format: RAW/ZIP

File size: 200 K format

Availability through: DECNET ARPANET BITNET

Access: A-00

Date of Latest Version: Jan 1985

Program Name: SUPERFISH (supfish)

Person to Contact: Los Alamos Accelerator Code Group
Address: MS B820, Group AF-6
Los Alamos National Laboratory
Los Alamos, NM 87545
USA

Telephone Number: (505) 667-6677 FAX 843-6677

Classification of Computer Code:

Component Design:

Ion Source, ☐ Magnet, ☒ RF cavity,

Accelerator Optimization:

Linac, ☐ Cyclotron, ☐ Synchrotron,

Tracking or Simulation:

Linac, ☐ Cyclotron, ☐ Synchrotron,

Analysis:

Stability, ☐ Impedances,

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

The SUPERFISH package evaluates the eigenfrequencies and fields for arbitrary shaped 2-D waveguides in cartesian coordinates and 3-D axially symmetric rf cavities in cylindrical coordinates. The package contains codes to generate the mesh, plot fields and evaluate auxiliary quantities of interest to drift tube linac design, e.g., transit time factors, power losses, effect of perturbations.

Publications describing the code:

K. Halbach and R. F. Holsinger, "SUPERFISH - A Computer Program for Evaluation of RF Cavities with Cylindrical symmetry," Part A, *Accel.* 7 (1976) 213.

K. Halbach et al., "Properties of the Cylindrical RF Evaluation Code SUPERFISH," Proc. 1976 Linear Accel. Conf., Chalk River Nuclear Lab Report AFCL-5677-122.

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

Send blank tape to above address, specify version desired (VAX or CRAY). Also available through ARPANET, DECNET, OR BITNET. Telephone us for instructions.

Source language: FORTRAN 77

Computers it runs on: VAX, CRAY

How available as: ☒ Source code, ☐ Executable only

Source Media: ☐ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☒ Network;

Tape format: crack, 1600 bpi

Diskette: crack, format

Available through: ☐ DECNET, ☒ ARPANET, ☒ BITNET

Network Address: 06-04and up

1. Date of Latest Version: Apr. 1986 Program Name: CRMP

Person to Contact: Jerry P. Jackson
Address: fermilab
P.O. Box 500
Batavia, IL 60510
USA

Telephone Number: (312) 840-2317 or (300)

Classification of Computer Code:

Component Design:

Ion Source, ☐ Magnet, ☐ RF cavity,

Accelerator Optimization:

Linac, ☐ Cyclotron, ☐ Synchrotron,

Tracking or Simulation:

Linac, ☐ Cyclotron, ☐ Synchrotron, ☒ Colliding Beam

Analysis:

Stability, ☐ Impedances,

Other

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

A computer program to simulate colliding beam dynamics in e^+e^- storage rings has been written. The first version of the program did not incorporate sextupoles but showed some of the characteristics measured in various machines in the past. The focus of the present work is the understanding of the effects of sextupoles on these results. To do this thin sextupoles are added in two ways. The first employs a linear transfer nonlinear kick algorithm for each lattice cell. The second method is to create a symplectic second-order transfer map for the entire machine. While the first method is exact, it is slow for machine lattices with many sextupoles. The luminosities, beam sizes, and time shifts from these programs are calculated. In addition, the shapes of the time averaged transverse distributions are obtained. The beam-beam interaction is accomplished each turn by first calculating the beam centroids and rms sizes, and then using this information to determine the transverse kicks received by each test particle. The bunch positions and sizes are output each turn. In addition, the test particle positions are binned and accumulated in 1000 turn intervals.

Radiation excitation and damping are added to each test particle each turn in order to maintain the initial (non-colliding) horizontal and vertical emittances. Since there are no energy oscillations the contribution to the horizontal beam size from the horizontal off energy function at the interaction region is replaced by additional betatron emittance.

Earlier versions of the program were in FORTRAN, but the latest version has been optimized for the IBM supercomputer at Cornell. It contains FORTRAN assembly language programming which would adapt to other machines.

Publication(s) describing this code

J. P. Jackson and R. H. Lemmon, "A Computer Simulation Study of e^+e^- Storage Ring Performance as a Function of Sextupole Distribution," IEEE Trans. Nucl. Sci., 1986, 33, 11.

Is usage documentation available? ☒ Yes ☐ No

How may the code be obtained?

Call Gerry Jackson

Source language: FORTRAN + EPS

Computers it runs on: IBM EPS-264

It is available as ☐ Source code, ☐ Executable only

Source Media: ☐ Listing, ☐ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format:

Diskette size & format:

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address:

Date of Latest Version: Jan 1986

Program Name: S1 No. 3

Person to Contact: Ardith S. Kenney
Address: Lawrence Berkeley Laboratory
1 Cyclotron Road
Building 46-161
Berkeley, CA 94720
U.S.A.

Telephone Number: 445-486-6631, FTS 451-6631

Classification of Computer Code:

Component Design:

Ion Source, Magnet, RF cavity,

Accelerator Optimization:

Lamac, γ Cyclotron, δ Synchrotron, ϵ Transport lines

Tracking or Simulation:

Linac, Cyclotron, π Synchrotron,

Analysis:

x) Stability, impedances,

Others:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

SYNCH is a computer program for use in the design and analysis of synchrotrons, storage rings and transport lines. Lattices are defined by statements describing beamlines and their components: drifts, dipoles, quadrupoles, sextupoles, other beamlines, etc. Betatron functions and closed orbit distortions due to momentum deviation or misalignments can be obtained. Orbits and beam ellipses can be tracked, and emittances, damping time, etc., calculated. Design of machines is done by versatile fitting algorithms.

Publications describing the code:

V. A. Gatten and A. S. Kenney, LBL; F. D. Courant, BNL; M. J. Syphers, FNAL, "A User's Guide to SYNCHRO" (1989).

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

A. A. Kamenov

Source Language: FORTRAN

Computers, it runs on VAX class

It is available as `src` Source code, `bin` Executable only

Source Media * Listing * Tape * Diskette * Cards * Networks

Approved: _____

Diskette use & format

Available through [* DFCNFI](#), [* ARPANET](#), [* BITNET](#)

New York Address: 101 Park Avenue, 10th Floor, New York, NY 10017-2499, U.S.A.

Date of Latest Version: Jan. 1986

Program Name: TBC1

Person to Contact: Thomas Weiland

Address: Deutsches Elektronen Synchrotron DESY
Notkestrasse 85 d2000
Hamburg 52
Federal Republic of Germany

Telephone Number: (49 40) 8998-3196

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☒ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☒ Stability, ☒ Impedances, ☒ Wakefield Effects

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

TBC1 analyzes the electromagnetic interaction between bunched beams of charged particles moving through cylindrically symmetric cavities by calculating wake fields. The default Gaussian shape function for the bunch may be replaced by a shape of the user's choice.

There are several post-processors for TBC1. WAKCOR subtracts a tube wake field from the total wake. WAKFES reads fields and wakes as saved at every time step and does a fourier transformation. WAKOUT reads the wake field and prints it. It can also calculate the gradient impedance, plot the bunch density and normalize wakes to ± 1 .

In addition there are two variations of TBC1. TBC100 follows the progress of TEM waves launched into a structure, e.g., a series of rf cavities connected by a vacuum pipe, from the left open boundary.

TBC101 is the same as TBC100 except that TM01 waves are launched into the structure.

Publications describing the code:

T. Weiland: Proceedings of the Xth International Conference of High Energy Accelerators, Geneva (1980), p. 101.

T. Weiland: Nucl. Instr. & Meth. 212(1983)13-14.

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

One must get the source code directly from Thomas Weiland.

Executable form of the code is installed at Los Alamos and Lawrence Livermore National Laboratories. For more information on these contact Therese Barts (303) 667-1085 (F) or 843-9385 (HAX).

Source language: FORTRAN 77

Computers it runs on: ☐ CRAY ☒ VAX ☒ VMS ☐ IBM 3090

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☐ Listing, ☐ Tape, ☐ Diskette, ☐ Cards, ☒ Networks

Tape format: *EBCDIC*

Diskette size & format:

Available through: ☐ DECNET, ☐ ARPANET, ☒ BITNET

Network Address: mpywei@llhhdcsy3.bitnet

Date of Latest Revision: 01/01/1987

Program Name: TEAPOT

Person to Contact: Wesley Schuchinger
Address: SSC-0101
SLAC, MS-00-0000
One Cyclotron Road
Berkeley, CA 94708
U.S.A.

Telephone Number: (415) 486-0700, F1 x 451, 450

Classification of Computer Code:

Component Design:

Ion Source: ☐ Magnet: ☐ RF cavity:

Accelerator Optimization:

Linac: ☐ Cyclotron: ☒ Synchrotron:

Tracking or Simulation:

Linac: ☐ Cyclotron: ☒ Synchrotron:

Analysis:

Stability: ☐ Impedances:

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

TEAPOT (Thin Element Accelerator Program for Optics and Tracking), developed for design work on the Supercollider (SSC), is a tracking code which treats all elements (aside from drifts) as thin elements. TEAPOT reads a lattice in standard (MAD) Input Format and converts all thick elements to thin ones. If a quadrupole is of "interaction region" type, it is split into four thin quadrupoles. TEAPOT neglects fringe fields. A Twiss analysis can be performed and the tunes can be adjusted using a thin lens matrix representation of the machine. Magnetic errors and misalignments can be added to elements, and the resulting lattice can be tracked exactly. A full Twiss analysis with errors is also available, which uses tracking to derive the transfer matrices for the machine. The machine can be decoupled using skew quadrupoles, the tunes can be readjusted, and the chromaticity can be fit in the presence of errors. The command format for TEAPOT is a dialect of that used by MAD.

There exists a postprocessor called MATPOT that produces a third order 4×4 matrix representation for the full ring. The output of MATPOT can be put into MARYLENE for the calculation of auxiliary quantities such as chromaticity and nonlinear invariants. MATPOT was written by Etienne Forest.

Publication describing the code:

1. Schuchinger and R. Talman: Part A (to be published)

2. Schuchinger and R. Talman: TEAPOT - A Thin Element Accelerator Program for Optics and Tracking - SSC Central Design Group internal report - C-012 (1985)

3. Etienne Forest: The Algebraic Maps and Invariants Produced by Tracking Codes - C-018 (1987)

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

1. Contact Wesley Schuchinger

Source code available on QDDP disk

•

• Computers: IBM, CDC, CYBER, and SUN

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☐ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☒ Networks

Tape format:

Diskette file & format:

Available through: ☒ DECNET, ☒ ARPANET, ☒ BITNET

Network Address: ☒ SA LINDSAY @decnet, LINDSAY@BUCSAC.carpw or indnet, LINDSAY@BUCSAC@netc

Date of Latest Version: 1997-03-08

Program Name: FOCUS 2.00.01

Person to Contact: John S. Whitney
Address: 2000r Fields Road
Osney Mead
Oxford OX2 0FF
England

Telephone Number: 01865 248936

Classification of Computer Code:

Component Design:

☒ Ion Source, ☒ Magnet, ☐ RF cavity,

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron,

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron,

Analysis:

☐ Stability, ☐ Impedances,

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

FOCUS is a 3D code for magnetostatic and electrostatic fields. It is the most advanced program available for non-linear magnetostatic field computation. It can be used for a wide range of applications including fusion magnets, particle accelerators, electron lenses, and deflection magnets; corrosion protection and non-destructive testing. FOCUS uses a discrete finite element model in order to solve the partial differential equations governing the behavior of a system.

The finite element mesh is formed from hexahedra with ruled faces which are automatically subdivided into elements. A 3D grid is created initially and this can then be swept through space thus creating 3D volumes. The sweep operations include translation, rotation and projection.

One of FOCUS special features is that the finite element mesh does not have to model the conductor. These can slice through the mesh quite arbitrarily. The conductors are modeled using a set of primitive shapes that include arcs, bars, curved sided hexahedra and more complex, complete circuits.

The mesh primitive blocks are assigned material names and geometric properties. For example, non-linear materials are provided for input of non-linear constitutive relationships and for display of the function values and derivatives.

FOCUS uses 8 and 20 node isoparametric brick elements. These can be mixed together, the program will enforce inter-element continuity. The type of element created in each primitive may be selected by the user. This allows the higher order elements to be used where solution accuracy is important. Three result evaluation modes are provided to give a choice between speed and accuracy.

The FOCUS program was designed to be used in a distributed computing environment. It is written in FORTRAN 77 and FOCUS can be easily transferred between computers and result files from FOCUS can be examined. FOCUS provides full check points, checkpoints, restart facilities, a library of programs may move the efficient use of computer resources. The FOCUS program allows results to be displayed graphically and further calculations can be performed e.g. particle trajectories.

Publications describing the code:

IEEE Proc. 53-1-127 PCB No. 641800

Vector Fields Data sheet Ref. 948611

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

By license agreement with Vector Fields Ltd

Source language: FORTRAN 77

Computers it runs on: PRIME VAX IBM

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☐ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format: As required

Diskette size & format:

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

☒ DOE Network

Network Address: Contact Robert J. Larr, Argonne Natl Lab (312) 972-6632

Date of Latest Version: Apr. 1986

Program Name: TRACE

Person to Contact: The Los Alamos Accelerator Code Group
Address: MS B829, Group AT-6
Los Alamos National Laboratory
Los Alamos, NM 87545
USA

Telephone Number: (505) 667-6677 or (2839) FTS 843-6677

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☒ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

TRACE is an interactive, first order envelope-tracing, beam dynamics computer code with space charge. It includes some unique features as well as a number of elements not commonly found in other beam-transport programs such as the permanent magnet quadrupole (PMQ), radio frequency quadrupole (RFQ), RF gap, accelerator column, and accelerator tank. The code also has a number of fitting capabilities, allowing almost any element parameter in the beamline to be varied, including space charge. TRACE calculations provide immediate graphic display, including the beam envelope and the phase-space ellipses in the transverse dimensions. The program is easy to use and contains its own help package that lists all instructions necessary for input, calculations, and graphic output.

Publications describing the code:

K. R. Crandall, D. P. Ruston, 'TRACE: An Interactive Beam Transport Code,' Proceedings of the 1984 Linear Accelerator Conference, Darmstadt-Seehorn, FRG (1984) 371-373.

K. R. Crandall, D. P. Ruston, 'Documentation for TRACE: An Interactive Beam Transport Code' Los Alamos National Laboratory Internal Report No. LA-10235-MS (1985) 66 pp.

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

Contact: The Los Alamos Accelerator Code Group or D. Ruston (505) 667-2796, FTS 843-2796

Source language: FORTRAN

Computer: It runs on CDC 6600, 7600, VAX 11/750

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☐ Taping, ☒ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format: VAX 11/750 type VAX II

Diskette format:

Available through: ☐ DECNET, ☒ ARPANET, ☒ BITNET

Network Address:

• Date of Latest Version: Jan. 1986

Program Name: TRACE 3-D

Person to Contact: The Los Alamos Accelerator Code Group
Address: MS D820, Group AF-6
Los Alamos National Laboratory
Los Alamos, NM 87545
USA

Telephone Number: (505)667-6677 ext. 2839; FTS 843-6677

Classification of Computer Code:

Component Design:

Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☒ Linac, ☐ Cyclotron, ☐ Synchrotron,

Tracking or Simulation:

☒ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

TRACE 3-D is an interactive program that calculates the envelopes of a bunched beam (including linear space charge forces) through a user-defined transport system. The transport system may consist of the following elements: 1) drift, 2) thin lens, 3) quadrupole, 4) permanent magnet quadrupole (PMQ), 5) solenoid, 6) doublet, 7) triplet, 8) bending magnet, 9) edge angle (for bend), 10) rf gap, 11) radio-frequency quadrupole cell (RFQ), 12) rf cavity, 13) coupled cavity tank, 14) a user-defined element, and 15) a coordinate rotation.

The beam is represented by a 6×6 σ matrix (introduced by the TRANSPORT program) defining a hyperellipsoid in six-dimensional phase space. The projection of this hyperellipsoid on any two-dimensional plane is an ellipse that defines the boundary of the beam in that plane. Using a sequence of matrix transformations, the beam can be "followed" between any two elements. The user can change any parameter and observe the effect on the beam envelopes and on the output beam ellipses. Also, several matching options are available that determine values for the ellipse parameters or for specified transport system parameters (such as quadrupole gradients) to meet specified objectives.

Publications describing the code:

1. R. Candel and J. R. Mills, TRACE 3-D Documentation, Los Alamos National Laboratory internal document 614.

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

From the Los Alamos Accelerator Code Group. Contact Helen Stokes, AF-6, LANL, (505)667-4931 or (505)667-6677 ext. 843-4931.

Source Language: FORTRAN

Computer it runs on: CRAY

Is it available as: ☐ source code ☒ executable only

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- Source Media: ☐ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☒ Networks
 - Tape format:
 - Diskette size & format:
- Available through: ☐ DECNET, ☒ ARPANET, ☒ BITNET
- Network Address: `lks@lanl.arpa`

Date of Latest Version: 1981

Program Name: TRACK

Person to Contact: Robert J. Eari

Address: Argonne National Laboratory
Argonne, IL 60439
USA

Telephone Number:

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron,

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☒ spectrometers

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

The TRACK BEAM commands of GEUN 3D are useful for tracking a charged particle through a magnet field and plotting the path. It was felt the subroutines associated with these two commands would form a useful stand alone program where the user supplied the magnetic field instead of the GEUN 3D calculated field. Hence, measured fields could also be used. The user supplied fields are stored on disk as a field map or as the edge field of a uniform field magnet. The graphic subroutines are written for use on the Tektronix 4012.

Publications describing the code:

R. J. Eari "TRACK - A Program to Track Charged Particles Through a Magnetic Field and Plot the Path" Proc. of a Workshop on High resolution Large acceptance Spectrometers, at Argonne National Laboratory (1981) Argonne National Laboratory report ANL-PHY-81-2 and CONF-8109123

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

Contact Robert J. Eari

Source language: FORTRAN

Computer it runs on: IBM

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☐ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format: UNCL, 30 RECFM=FB,BLK=321,500

Diskette size & format

Available through: ☐ DECNET ☐ ARPANET ☐ BITNET

Network Address: none

Date of Latest Version: unknown

Program Name: TRAJECTORY

Person to Contact: A. C. Paul
Address: MS 4626
Lawrence Livermore National Laboratory
Livermore, CA 94550
USA

Telephone Number: (415) 423-3183, FTS 543-3183

Classification of Computer Code:

Component Design:

Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

Linac, ☐ Cyclotron, ☐ Synchrotron,

Tracking or Simulation:

Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

An orbit and ion optic matrix transport program originally used for the 184 inch LBL cyclotron

Transport matrix output can be used as input to TRANSPORT or OPTIC - 50 K_a memory, runs in 1 min. on CDC 6600

Will track protons and pions in the median plane of the cyclotron

Publications describing the code:

A. C. Paul - TRAJECTORY - An Orbit and Ion Optic Matrix Program for the 184 inch Cyclotron
Lawrence Berkeley Laboratory Report UCRL 19407 (1969)

John S. Coleman, "Particle Accelerator Design - Computer Programs," Academic Press, New York (1974).

Is code documentation available? ☐ Yes ☐ No

How may the code be obtained?

unknown

Source language: FORTRAN

Computer: RUNS on CDC 6600, 6000, VAX 11/780

It is available as: ☐ Source code, ☐ Executable only

Source Media: ☐ Taping, ☐ Tape, ☐ Diskette, ☐ Cards, ☐ Network,

Tape format

Diskette file format

Available through: ☐ DECNET ☐ ARPANET ☐ BITNET

Accessed Address

•
• Date of Latest Version: unknown Program Name: TRAMP

Person to Contact: J. W. Gardner
Address: Rutherford Appleton Laboratories
Chilton, Didcot
Oxon OX11 0QX
England

Telephone Number:

Classification of Computer Code:

Component Design:

Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

Linac, ☐ Cyclotron, ☐ Synchrotron, ☒ Beam Transport

Tracking or Simulation:

Linac, ☐ Cyclotron, ☐ Synchrotron, ☒ Beam Transport

Analysis:

Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

Program TRAMP was developed at Rutherford High Energy Laboratory by Gardner and Whiteside to provide solutions to problems encountered in beam transport design. It has been extensively modified by various experimenters to fit the needs and the computer facilities of their respective laboratories.

The LBL version is capable of tracking and matching trajectories, beam profiles, or phase-space ellipses through a given beam transport system. Most beam elements are represented by 2x2 matrices for each plane, but the code handles sextupoles by integration of trajectories. Matching can be done on dispersion.

Publications describing the code:

J. W. Gardner and D. Whiteside, "TRAMP - Tracking and Matching Program," Rutherford Laboratory Report NRL-M-41 (1964).

J. W. Gardner and D. Whiteside, "A FORTRAN version of TRAMP," Rutherford Laboratory Report NRL-M-41 (1964).

Turner, J. ed., "Particle Accelerator Design Computer Programs," Academic Press, New York, 1974, p. 17.

Is source documentation available? ☐ Yes ☒ No

How may the code be obtained?

Unknown. May still be available from LBL.

How many copies are COPYABLE?

Comments on this program: (if known)

Program is in a Fortran source code. Executable only.

Date of Latest Version: Mar. 1985 Program Number: 113X10

Person to Contact: Ewa S. Bozoki
 Address: NSLS Dept.
 Brookhaven National Laboratory
 Upton, NY 11973
 USA

Telephone Number: (516) 292-3701

Classification of Computer Code:

Component Design:

Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

Linac, ☐ Cyclotron, ☐ Synchrotron, ☒ Transport lines

Tracking or Simulation:

Linac, ☐ Cyclotron, ☐ Synchrotron, ☒ Transport lines

Analysis:

Stability, ☐ Impedances, ☐

Other: Control

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

Purpose: To provide a tool to examine and control of transport lines in terms of beam and machine parameters using the mathematical model of the system.

It is a modeling program, which can be used

- 1) off line as a design program (like, e.g., TRANSPORT) or
- 2) on line as a control program. (When used as a control program, the program/microprocessor interface is specific to the installation.)

The program can perform

- 1) ellipse matching -- calculate, control the orientation and shape of the phase space ellipses
- 2) ellipse positioning -- calculate, control the position of the center of the phase space ellipses
- 3) beam steering

A real graphic display program for GE 5010 or GTE 4000 display system is also available.

Other data are read from input files. User program interface is through screen and it is designed in a way as to facilitate the input and minimize the effort (using data validation and defaulting).

Publication describing the code

Is code documentation available? ☐ Yes ☒ No

How may the code be obtained?

Eva S. Bozoki, "High Level Control Programs at NSLS" - Computing in Accelerator Design and Operation, 1983: 420

Source language: FORTRAN

Computers it runs on: DG

It is available as: ☐ Source code, ☐ Executable only

Source Media: ☐ Listing, ☐ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format:

Diskette size & format:

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET
☐

Network Address:

Date of Latest Version: Jan 1986

Program Name: TRANSOPTER

Person to Contact: Mark S. de Jong
Address: Accel. Phys. Branch
Chalk River Nuclear Laboratories
Chalk River, Ontario K0J-1J0
Canada

Telephone Number: (613) 584-3311

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☒ Beam Transport

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

A beam transport design code with parametric optimization. The code analyzes the transport of charged particle beams through a user defined magnet system. Space charge effects may be included either in two dimensions, treating transverse forces only, or in three dimensions by treating both transverse and longitudinal forces on the beam. The magnet system parameters are varied (within user defined limits) until the properties of the transported beam and/or the system transport matrix match those properties requested by the user. The code uses matrix formalism to represent the transport elements and optimization is achieved using the variable metric method. For problems without space charge a first or second order matrix formalism can be selected. Any constraints that can be expressed algebraically may be included by the user as part of his design.

Publications describing the code:

R. M. Hutchison and E. A. Hefghway, Nuc. Inst. & Mtds. 187 (1981) 89-95

E. A. Hefghway and M. S. de Jong, "A First Order Space Charge Option for TRANSOPTER," IEEE Trans. NS-30 (1983) 2668

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

From Mark de Jong, or from Edward A. Hefghway, AT-9, MS H829, Los Alamos National Laboratory, Los Alamos, NM 87545 (505) 667-1543, EPS 84C-1543

Source language: FORTRAN 77

Computers it runs on: CDC, CYBER, CRAY

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☒ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format: as desired

Diskette size & format:

Available through: ☐ DFG-NET, ☐ ARPANET, ☐ BITNET

Network Address:

Date of Latest Version: June 1985

Program Name: 'TRANSPORT'

Person to Contact: David C. Carey

Address:

1900 1898 5000

BUTVIA 11. 60510

USA

Telephone Number: 312 840-3639, FTS 370-3639

Classification of Computer Code:

Component Design:

Ion Source, Magnet, RF cavity, .

Accelerator Optimization:

Lamac, Cyclotron, Synchrotron, & Beam Line

Tracking or Simulation:

LInac, Cyclotron, Synchrotron, x! Beam Line

Analysis:

Stability, Impedances,

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

Beam line transfer matrix calculation and fitting program. Calculates floor coordinates, beam matrix, and first, second and some third order transfer matrices. Elements included are bending-magnet, quadrupole, sextupole, octupole, solenoid, and accelerating cavity. Can simulate misalignments, beam steering, and random errors for any beam line parameter. The code will accept input in the MAD format.

Publications describing the code:

TRANSPORT number SLAC 91, or NAL 91, or CERN 80-04

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

Contact: Sue Mc Namara, Program Librarian

Formulate P.O. Box 300 Batavia, IL 60010

Source language: FORTRAN

Computer: 2 CPUs on 1 DEC IBM VAX

It is available as: **Source code,** **Executable only**

Source: Media, Listing, & Tape, Diskette, Cards, Networks

before to get out of anything

Die kette ist ein format

Available through DECELT, ARPADEL, & BENEFIT

Network Address (must be actual IP address for UCLM)

Date of Latest Version: unknown

Program Name: TRANSPORT LBL Version

Person to Contact: Arthur C. Paul

Address: MS L 626,

Lawrence Livermore National Laboratory

P.O. Box 808

Livermore, CA 94550

USA

Telephone Number: (415) 423-3183; FTS 543-3183

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☒ Beam lines

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☒ Beam lines

Analysis:

☒ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

TRANSPORT is a computer code for calculating properties of charged particle beam transport systems using the matrix method in a six-dimensional phase space and a version of TRANSPORT was translated into FORTRAN from the original BALGOL SLAC TRANSPORT. Some of the important additions are polygon transformation, ray tracing, particle separator, space charge, output plotting, interactive on-line calculations, and flexible data manipulation procedures.

Publications describing the code:

A. C. Paul, "TRANSPORT: An Ion Optic Program - LBL Version," LBL Internal Report 2697 (1975) 6pp

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

Source language:

Computers it runs on:

It is available as: ☐ Source code, ☐ Executable only

source Media: ☐ Listing, ☐ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format:

Diskette size & format:

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Notes & Address:

Date of Latest Version: unknown

Program Name: TRANSVRS

Person to Contact: Karl Bane

Address: Stanford Linear Accelerator Center

SLAC BIN 26

P.O. Box 1349

Stanford, CA 94305

USA

Telephone Number: (415) 497-2026, FTS 461-9300 ext. 2026

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☒ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☒ Stability, ☐ Impedances, ☒ Wakefield Effects

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

TRANSVRS is a code to calculate the frequencies of a large number of deflecting modes in a periodic array of rf cavities. Using these frequencies one can calculate the transverse wakefield forces on a bunch beam tending to cause beam breakup.

Publications describing the code:

K. Bane and B. Zotter, "Transverse Modes in Periodic Cylindrical Cavities," Proc. of 11th Int'l Con on High Energy Accelerator, Geneva, Switzerland, July 7-11, 1980, Birkhauser Verlag, Basel (1980).

Is code documentation available? ☐ Yes ☐ No

How may the code be obtained?

Call Karl Bane

Source language:

Computers it runs on:

It is available as: ☐ Source code, ☐ Executable only

☐ Tape Media, ☐ Listing, ☐ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

File format:

Diskette size & format

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address: LBANE@SLACVM.BITNET

Date of Latest Version: unknown

Program Name: TRIDIF

Person to Contact: John R. Freeman

Address: Org 1241, Bldg 980
Sandia National Laboratory
P.O. Box 5800
Albuquerque, NM 87115
USA

Telephone Number: (505)844-5254, FTS 844-5254

Classification of Computer Code:

Component Design:

☐ Ion Source, ☒ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

TRIDIF is a time-dependent diffusion version of the well known PANDIRA-POISSON-TRIM triangular mesh magnet code. Modifications allow TRIDIF to treat field diffusion in materials with time-varying permeabilities. Good agreement between the measured and computed magnetic fields was found for a simple test experiment.

See also documentation on PANDIRA-POISSON and TRIM

Publications describing the code:

M. L. Hodgdon, J. R. Freeman, "Transient Magnet Field Calculations with TRIDIF," Sandia National Laboratory Internal Report No. SAND 81-2001C, CONF-810954-1 (1981) 10pp

Is code documentation available? ☐ Yes, ☐ No

How may the code be obtained?

Contact John Freeman. Hodgdon has left Sandia

Source language:

Computers it runs on:

It is available as: ☐ Source code, ☐ Executable only

Source Media: ☐ Listing, ☐ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format:

Diskette size & format:

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address:

Date of Latest Version: 1975

Program Name: FRIM-ANL-66-0000

Person to Contact: Robert E. Eari 360
Address: Argonne National Laboratory
4700 S. Cass Ave
Argonne, IL 60439
USA

Telephone Number: (312)972-6632 FTS 972-6632

Classification of Computer Code:

Component Design:

Ion Source, ☒ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

FRIM - 2D magnetostatic code, FORGY - Force calc on coils and steel

Publications describing the code:

Alan M. Winslow UCRL 7784 F (1965)

R. Eari, FRIM - Unpublished User Guide

R. Eari, FORGY - ANL Internal Report FRK RIL 2 (1972)

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

Contact Robert Eari

Source language: FORTRAN

Computer it runs on: IBM 370

How available as: ☒ Source code, ☐ Executable only

Source Media: ☐ Listing, ☒ Tape ☐ Dockette, ☐ Cards, ☐ Network

Tape format: TRFCL - 80 RECLM - 110 BEL, L2E - 800

Dockette size & format

Available through: ☐ DESNET, ☐ ARPANET, ☐ BITNET

Network Address: 0000

Date of Latest Version: unknown

Program Name: TRIO

Person to Contact: T. Matsuo

Address: College of General Education

Osaka Univ.,

Toyonaka,

Japan

Telephone Number:

Classification of Computer Code:

Component Design:

Ion Source, ☐ Magnet, ☐ RF cavity,

Accelerator Optimization:

Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

Linac, ☐ Cyclotron, ☐ Synchrotron, ☒ Beam Lines

Analysis:

Stability, ☐ Impedances,

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

TRIO (Third Order Ion Optics) is a computer program for the calculation of ion trajectories; it is applicable to any ion optical system consisting of drift spaces, cylindrical or toroidal electric sector fields, homogeneous or inhomogeneous magnetic sector fields, magnetic and electrostatic Q lenses. The influence of the fringing field is taken into consideration. The trajectory calculation can execute with accuracy up to third order. Any one of three dispersion bases, momentum, energy, mass and energy, may possibly be selected.

Publications describing the code:

T. Matsuo, H. Matsuda, Y. Fujita, H. Wollnik, "Computer program 'TRIO' for Third Order Calculation of Ion Trajectory," Jitsuryo Hunsoku (Japan) v. 24.1 (1979) 19-62. Also available as: Proceedings of the Third Symposium on Ion Sources and Application Technology (1979) 25-28.

H. Wollnik and Matsuo, "Addition of Flight Time Calculation to Computer Program TRIO," Mass spectroscopy 27 (1979) 131-134.

Is code documentation available? ☐ Yes ☐ No

How may the code be obtained?

unknown

Source language:

Computer it runs on:

It is available as: ☐ Source code, ☒ Executable only

Source Media: ☐ Listing, ☐ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format:

Diskette size & format:

Available through: ☐ DECNET ☐ ARPANET ☐ BITNET

Access Address:

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• Date of Latest Version: Apr 1985 Program Name: FURTF

Person to Contact: David C. Carey
Address: Fermilab
P.O. Box 500
Batavia, IL 60510
USA

Telephone Number: (312) 840-3639 EFS 370-3639

Classification of Computer Code:

Component Design:

Ion Source, ☐ Magnet, ☐ RF cavity,

Accelerator Optimization:

Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

Linac, ☐ Cyclotron, ☐ Synchrotron, ☒ Beam Line

Analysis:

Stability, ☐ Impedances,

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

Simulation of single pass, charged particle beam lines and spectrometers. Includes geometric terms and all order chromatic effects for individual quadrupoles, bending magnets, sextupoles, and solenoids. Accumulates effects regardless of order. Can make specified one- and two dimensional histograms of particle coordinates at any beam line location.

Publications describing the code:

National Accelerator Laboratory internal report 64 (FURTF manual)

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

Dr. M. Samara, Princeton University

Fermilab, P.O. Box 500 Batavia, IL 60510

Source language: FORTRAN

Computer(s) it runs on: IBM VAX

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☐ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☐ Network

Tape format: most anything

Diskette: any format

Available through: ☐ DECNET ☐ ARPANET ☒ BITNET

Network Address: 00000000

• Date of Latest Version: Jun 1985

Program Name: ULTRAFISH

Person to Contact: Los Alamos Accelerator Code Group
Address: MS H-829, Group A1-6
Los Alamos National Laboratory
Los Alamos, NM 87544
USA

Telephone Number: (505) 667-6677 for 667-28391, FTS 844-6677

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☒ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

ULTRAFISH computes the resonant frequencies and fields in an rf cavity which is a figure of revolution for azimuthally asymmetric modes. It will handle regions of different permeability and dielectric constant. It works for some geometries, but not others. The code has essential problems involving boundary conditions that have never been overcome.

Publications describing the code:

R. L. Gluckstern, R. F. Holsinger, K. Halbach and G. N. Muerbo, "ULTRAFISH - Generalization of SUPERFISH to m = 1," Proc. 1981 Linear Acc. Conf. in Santa Fe, Los Alamos Report LA-9234-C, p. 102.

Is code documentation available? ☐ Yes ☒ No

How may the code be obtained?

It is not available for distribution.

Source language

Computers it runs on:

It is available as: ☐ Source code, ☒ Executable only

source Media: ☐ Listing, ☐ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format:

Diskette size & format:

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address:

Date of Latest Version: Jan 1995

Program Name: 03291

Person to Contact: Thomas Wind

Address: Deutsches Elektronen-Synchrotron DESY
Notkestrasse 85 D2000
Hamburg 52
Federal Republic of Germany

Telephone Number: 10 10 8008 3106

Classification of Computer Code:

Component Design:

Ion Source, Magnet, RF cavity,

Accelerator Optimization:

Lamac, Cyclotron, Synchrotron,

Tracking or Simulation:

Linac, Cyclotron, Synchrotron,

Analysis:

* Stability, * Impedances, * Wake field effects

() 110000.

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

FIRMP computes symmetric ($m = 0$) and asymmetric ($m \neq 0$) resonant modes in cavities and frequencies of longitudinally homogeneous fields in waveguides for cylindrically symmetric accelerating structures. It uses a rectangular mesh. Only the electric field components in the (r, z) plane are used for the calculation of the transverse modes instead of H_ϕ & E_ϕ . The discretization is based on FET (Finite Integration Technique) described in the reference. Many modes are found on one pass.

Publications describing the code:

F. Weiland, *Electronics & Communication (AFU)* 31 (1977) 116.

J. Werland, Nucl. Inst. & Meth. 216 (1983) 329.

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

You must get the code directly from Thomas Weiland

For a full-term film of the slide is installed at Los Alamos and Lawrence Livermore National Laboratory. For more information on these contact: Thomas Barry (office) 9489 at Los Alamos.

Source Language FORTRAN 77

Computer: 4 CPUs on CRAY T3E 2M (IBM 200)

0 = variable or ∞ = super code, 1 = printable only

Source: Media - Internet - Japan - Internet - Canada - Networks

1. *Impatiens* 2. *Impatiens* 3. *Impatiens* 4. *Impatiens* 5. *Impatiens* 6. *Impatiens* 7. *Impatiens* 8. *Impatiens* 9. *Impatiens* 10. *Impatiens* 11. *Impatiens* 12. *Impatiens* 13. *Impatiens* 14. *Impatiens* 15. *Impatiens* 16. *Impatiens* 17. *Impatiens* 18. *Impatiens* 19. *Impatiens* 20. *Impatiens* 21. *Impatiens* 22. *Impatiens* 23. *Impatiens* 24. *Impatiens* 25. *Impatiens* 26. *Impatiens* 27. *Impatiens* 28. *Impatiens* 29. *Impatiens* 30. *Impatiens* 31. *Impatiens* 32. *Impatiens* 33. *Impatiens* 34. *Impatiens* 35. *Impatiens* 36. *Impatiens* 37. *Impatiens* 38. *Impatiens* 39. *Impatiens* 40. *Impatiens* 41. *Impatiens* 42. *Impatiens* 43. *Impatiens* 44. *Impatiens* 45. *Impatiens* 46. *Impatiens* 47. *Impatiens* 48. *Impatiens* 49. *Impatiens* 50. *Impatiens* 51. *Impatiens* 52. *Impatiens* 53. *Impatiens* 54. *Impatiens* 55. *Impatiens* 56. *Impatiens* 57. *Impatiens* 58. *Impatiens* 59. *Impatiens* 60. *Impatiens* 61. *Impatiens* 62. *Impatiens* 63. *Impatiens* 64. *Impatiens* 65. *Impatiens* 66. *Impatiens* 67. *Impatiens* 68. *Impatiens* 69. *Impatiens* 70. *Impatiens* 71. *Impatiens* 72. *Impatiens* 73. *Impatiens* 74. *Impatiens* 75. *Impatiens* 76. *Impatiens* 77. *Impatiens* 78. *Impatiens* 79. *Impatiens* 80. *Impatiens* 81. *Impatiens* 82. *Impatiens* 83. *Impatiens* 84. *Impatiens* 85. *Impatiens* 86. *Impatiens* 87. *Impatiens* 88. *Impatiens* 89. *Impatiens* 90. *Impatiens* 91. *Impatiens* 92. *Impatiens* 93. *Impatiens* 94. *Impatiens* 95. *Impatiens* 96. *Impatiens* 97. *Impatiens* 98. *Impatiens* 99. *Impatiens* 100. *Impatiens*

10: Kretschmer, 1997, p. 100, fn. 10.

Available through DOE's Office of Biological Terrestrial Resources

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• Date of Latest Version: Apr 1986 Program Name: URMEL 1

Person to Contact: Thomas Weiland
Address: Deutsches Elektronen-Synchrotron DESY
Notkestrasse 85 d2000
Hamburg 52
Federal Republic of Germany

Telephone Number: 49 40 8998-3196

Classification of Computer Code:

Component Design:

Ion Source, ☐ Magnet, ☒ RF cavity, ☐

Accelerator Optimization:

Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☒ Stability, ☒ Impedances, ☒ Wake field effects

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

URMEL 1 computes symmetric (m=0) and asymmetric (m≠0) resonant modes in cavities and frequencies of longitudinally homogeneous fields in waveguides for cylindrically symmetric accelerating structures. It uses a triangular mesh instead of the rectangular mesh used by URMEL.

Publications describing the code:

T. Weiland, Electronics & Communication (AEÜ) 31 (1977) 116

C. van Rienen and T. Weiland, "Triangular Discretization Method for the Evaluation of RF fields in Waveguides and Cylindrically Symmetric Cavities," IEEE Trans. MAG 21 (1985) 2317-20

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

One must get the code directly from Thomas Weiland

Executable form of the code is installed at Los Alamos and Lawrence Livermore National Laboratories. For more information on these contact Therese Harris (505) 667-9385 at Los Alamos National Laboratory.

Source Language: FORTRAN 77

Computers it runs on: CRAY VAX VME IBM 3081

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☐ Printing, ☒ Tape, ☐ Diskette, ☐ Cards, ☒ Networks

Tape is on at: ERL 196

Diskette is on: ☐ format

Available through: ☐ DECNET ☐ ARPANET ☒ BITNET

Network Address: compuser@desy.debitnet

Date of Latest Version: June 1986

Program Name: WAVE

Person to Contact: David W. Forslund
Address: MS E531, X DO
Los Alamos National Laboratory
Los Alamos, NM 87545
USA

Telephone Number: (505) 667-4370 FTS 843-4370

Classification of Computer Code:

Component Design:
Ion Source, ☐ Magnet, ☐ RF cavity, ☐
Accelerator Optimization:
Linac, ☐ Cyclotron, ☐ Synchrotron, ☐
Tracking or Simulation:
Linac, ☐ Cyclotron, ☐ Synchrotron, ☐
Analysis:
Stability, ☐ Impedances, ☐
Other: Laser beat wave accelerators

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

WAVE is a 2D particle-in-cell code for self-consistently solving Newton's equations of motion and Maxwell's equations. It has application to space charge problems, plasmas and analysis of laser-plasma interactions. It is portable to any installation. Partial documentation exists.

Publications describing the code:

D. W. Forslund, "Fundamentals of Plasma Simulation," *Space Science Reviews* 42 (1985) 3-16
R. L. Morse and C. W. Nielson, "Numerical Simulation of the Weibel Instability in One and Two Dimensions," *Phys. Fluids* 14 (1971) 830
C. Joshi et al., "Ultra-high Gradient Particle Acceleration by Intense Laser-driven Plasma Density Waves," *Nature* 311 (1984) 525

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

Call David Forslund

Source language: FORTRAN 77

Computer it runs on: PC's, VAX, CRAY, IBM

It is available as: ☐ Source code, ☐ Executable only

Source Media: ☐ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☒ Networks
Tape format: as listed
Diskette size & format:

Available through: ☐ DECNET, ☒ ARPANET, ☒ BITNET

Network Address: twtfund@pa

Date of Latest Version: Dec. 1986 Program Name: WIGWAM
 Person to Contact: John M. Jowett
 Address: LEP Division
 CERN
 CH-1211 Geneva 23
 Switzerland

Telephone Number: (022) 83 66 43 or 83 50 86

Classification of Computer Code:

Component Design: ☐ Ion Source, ☐ Magnet, ☐ RF cavity,
 Accelerator Optimization: ☐
 Linac, ☐ Cyclotron, ☒ Synchrotron,
 Tracking or Simulation: ☐
 Linac, ☐ Cyclotron, ☐ Synchrotron,
 Analysis: ☐
 Stability, ☐ Impedances, ☐
 Other: Electron storage ring performance, wigglers

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

WIGWAM evaluates the parameters and performance of electron-positron storage rings in a very flexible way. It includes the effects and will calculate the excitations for normal dipole wigglers and nonlinear wigglers (combined function quadrupoles-sextupole or dipole-octupole) using appropriate generalizations of the usual electron ring formulae. The program will also optimize performance (e.g. maximise luminosity, minimise energy spread, etc.) by calculating appropriate schemes for varying damping partition numbers, coupling, wiggler fields, RF voltage, etc. It also produces the "loofa" diagrams, which provide a global picture of the potential performance of a ring.

Although the program is still under development with a view to integration into the MAD environment, a working version is available.

Publications describing the code:

1. J. M. Jowett, "Luminosity and Energy Spread in LEP," CERN LEP TH 85-4 gives many examples of output.
2. J. M. Jowett, "Description of the WIGWAM Program," CERN internal report LEP Note 521.

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

Contact J. M. Jowett

Source language: FORTRAN

Computers it runs on: IBM

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☒ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☒ Networks
☐ Tape format
☐ Diskette (i.e. 5 1/4) format

Available through: ☐ DUNE I, ☐ ARPANET, ☒ BITNET,
☒ EARNET

Network Address: JOWETT@CERNVM

• Date of Latest Version: 1985

Program Name: WOLF

Person to Contact: K. Halbach

Address: Lawrence Berkeley Laboratory
1 Cyclotron Road
Berkeley, CA 94720
USA

Telephone Number: (415) 486 5868, FTS 451 5868

Classification of Computer Code:

Component Design:

☒ Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☐

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

The WOLF code solves POISSON's equation within a user-defined problem boundary of arbitrary shape. The code is compatible with ANSI FORTRAN and uses a two-dimensional Cartesian coordinate geometry represented on a triangular lattice. The vacuum electric fields and equipotential lines are calculated for the input problem. The user may then introduce a series of emitters from which particles of different charge-to-mass ratios and initial energies can originate. These non relativistic particles will then be traced by WOLF through the user-defined region. Effects of ion and electron space charge are included in the calculation. A subprogram PISA forms part of this code and enables optimization of various aspects of the problem. The WOLF package also allows detailed graphics analysis of the computed results to be performed.

Publications describing the code:

K. Halbach, "Mathematical Models and Algorithms for the Computer Program WOLF," Lawrence Berkeley Laboratory Internal Report no. LBL 4444 (1979).

D. L. Vogel, "WOLF: A Computer Code Package for the Calculation of Ion Beam Trajectories," LBL Internal Report no. LBL 18871 (1985).

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

Columbia Forks, LBL, (415) 486 5011

Source language: FORTRAN

Computers it runs on: VAX, CDC

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☐ Listing, ☒ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format:

Diskette size & format:

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address:

Date of Latest Version: June 1986

Program Name: ZAP

Person to Contact: Michael S. Zisman

Address: Mail Stop 47-112

Lawrence Berkeley Laboratory

1 Cyclotron Road

Berkeley, CA 94720

Telephone Number: (415) 486-5765, FTS 451-5765

Classification of Computer Code:

Component Design:

☐ Ion source, ☐ Magnet, ☐ RF-cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☒ Stability, ☐ Impedances, ☒ Intra-Beam Scattering (IBS) effects;

Lifetimes (Touschek, gas scattering)

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

ZAP can be used to calculate single bunch instability thresholds and instability growth rates from coupled bunch instabilities in storage rings, bunch lengthening, Touschek and gas scattering lifetimes, equilibrium emittances for electron beams in the presence of radiation damping, quantum fluctuations, and intrabeam scattering. It is an interactive, self-prompting code.

Publications describing the code:

Lawrence Berkely National Laboratory Report no. LBL 21270

Is code documentation available? ☒ Yes ☐ No

How may the code be obtained?

From Michael S. Zisman.

Source language: FORTRAN 77

Computers it runs on: VAX, Ridge

It is available as: ☒ Source code, ☐ Executable only

Source Media: ☐ Listing, ☐ Tape, ☒ Diskette, ☐ Cards, ☒ Networks

Tape format:

Diskette size & format: RX50

Available through: ☒ DECNET, ☒ ARPANET, ☒ BITNET

Network Address: ESO7:VX:zisman (code 41190)

zisman@lbl.arpa

zisman@lbl.bitnet

• Date of Latest Version: unknown

Program Name: ZFIELD

Person to Contact: Curry Sawyer

Address: E.G. & G. Energy Measurements, Inc.
Santa Barbara Operations
Goleta, CA 93117
USA

Telephone Number:

Classification of Computer Code:

Component Design:

☐ Ion Source, ☐ Magnet, ☐ RF cavity, ☐

Accelerator Optimization:

☐ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Tracking or Simulation:

☒ Linac, ☐ Cyclotron, ☐ Synchrotron, ☐

Analysis:

☐ Stability, ☐ Impedances, ☒ Space Charge

Other:

Short Description: (Purpose, capabilities, algorithms, special features, etc.)

ZFIELD, a trajectory computer code for a linac beam, has been written as a design aid to complement the TRANSPORT code. It includes space charge, plots the emittance ellipse at axial values, and plots beam radius. Comparing ZFIELD and TRANSPORT in drift regions, significant differences in beam radius predictions are found in the 2-Mev region for currents above 200 A and above 400 A in the 4-Mev region. Using ZFIELD, beam envelope growth for beams with different emittances can be compared and the effect of space charge on emittance growth can be shown graphically.

Publications describing the code:

C. Sawyer and N. Norris, "Estimation of Space Charge and Emittance Growth Effects in a Drift Region," Proceedings of the 1984 Linear Accelerator Conference, Darmstadt, Siedheim, report no. GSI-84-11, pp.349-51.

Is code documentation available? ☐ Yes ☐ No

How may the code be obtained?

unknown

Source language:

Computers it runs on:

It is available as: ☐ Source code, ☐ Executable only

Source Media: ☐ Listing, ☐ Tape, ☐ Diskette, ☐ Cards, ☐ Networks

Tape format:

Diskette size & format:

Available through: ☐ DECNET, ☐ ARPANET, ☐ BITNET

Network Address:

ACIS

Linear Accelerator

1984-1985