BUREAU OF ENGINEERING RESEARCH
THE UNIVERSITY OF TEXAS AT AUSTIN

Texas Institute for Computational and Applied Mathematics

TICAM Office, TAY 2.400 • Austin, Texas 78712 • (512) 471-3312 • Fax (512) 471-8694

RECEIVED
MAR 31 1998
OSTI

INTEL EQUIPMENT FOR RICE UNIVERSITY CONSORTIUM MEMBER OF ORNL
PARTNERSHIP IN COMPUTATIONAL SCIENCE

DOE/ER/25144--71

Grant #DE-FG05-9ER25144

PI: Mary Wheeler

A 56 node (with 16 megabytes per processor) Intel Paragon was purchased in part under this grant and installed at Rice University. Before acceptance, Rice and INTEL reached an agreement for trading in 16 nodes for additional memory; 32 megabytes for each of the 40 nodes. In August 1995, the machine was moved to The University of Texas at Austin (UT Austin) with Wheeler and members of the Center for Subsurface Modeling.

We give a brief list of accomplishments by members of the Center for Subsurface Modeling at UT Austin.

ACCOMPLISHMENTS

1. Two transport algorithms, a characteristic mixed finite element method and a higher order Godunov scheme, were implemented in a software package for the INTEL Paragon machine. Both methods employ a mixed finite element method for modeling diffusion/ dispersion. The software package is part of the GCT general package developed by the PICS consortia.
2. A mixed finite element method parallel code, PARCEL, for treating full tensor permeabilities was written.
3. Geochemical and biochemical parallel package was developed with an arbitrary number of mineral phases. Both kinetic and equilibrium reactions can be treated.
4. The modules described in 1. - 3. were combined; the resulting simulator is called ParSim1, (Parallel Aquifer and Reservoir Simulator). This package is undergoing extensive testing by Laura Toran, Oak Ridge National Laboratory Oak Ridge National Laboratory, Environmental Sciences Division, Mail Stop 6400, Oak Ridge, TN 37831; 423-574-7976 (ph), 423-574-7420 (fax).

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED

ph

MASTER

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

DISCLAIMER

**Portions of this document may be illegible
electronic image products. Images are
produced from the best available original
document.**

5. A two phase simulator, known as ParSim2 was developed. Case studies on bioremediation at Hanford were conducted.

6. Significant model development of the UTCHEM code was done to further adapt it to groundwater applications such as surfactant remediation more generally and accurately with respect to physical and chemical phenomena. This code has been successfully applied to field studies at Hill Air Force Base.

7. Work on a multicomponent, multiphase flow and transport compositional framework for petroleum reservoir simulation is in progress. This work is being in collaboration with Argonne National Laboratory.

8. Technology transfer was done via industrial Center for Subsurface Modeling affiliates' program and numerous presentations at technical meetings such as SIAM, AGU and SPE meetings and published papers.