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THE SIZE EFFECT ON THE GALVANOMAGNETIC
PROPERTIES OF A SEMICONDUCTOR

DISSERTATION

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By

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A theory is developed to explain the dependence of carrier transport in a thin semiconducting film on film thickness, magnetic field strength, and the dominant bulk scattering mechanism. This theory is based on the solution of the linearized Boltzmann equation in relaxation time form. The semiconductor is assumed to be bounded and nondegenerate with spherical energy surfaces and a scalar effective mass. It is also assumed to be flat banded with totally diffuse scattering at the surface. Classical Boltzmann statistics are used for equilibrium. The dependence of the relaxation time on the carrier energy is approximated by a power law equation.

The principle improvement over similar theories is the treatment of the dependence of the relaxation time on carrier energy. The power law approximation for this dependence is valid for randomizing and elastic scattering mechanisms. Scattering mechanisms which can be treated using this approximation include acoustic phonon (-1), piezoelectric (1), polar optical phonon (1), ionized impurity (3), and neutral impurity

(0) where the number in parentheses is the power index of the dependence of the relaxation time on absolute carrier velocity.

The solution of the Boltzmann transport equation under the above assumptions is used to calculate four transport coefficients: conductivity, Hall coefficient, Hall mobility, and longitudinal magnetoresistivity. These transport coefficients are expressed as unitless ratios by dividing each by its bulk, zero-magnetic-field limit. The resulting expressions for the transport coefficient ratios involve three parametric integrals which must be evaluated numerically.

These parametric integrals were evaluated using Gaussian-Laguerre and trapezoidal quadrature techniques. The values of the transport coefficient ratios were then calculated. The dependence of the transport coefficient ratios on film thickness, magnetic field, and power index were displayed in graphs.

Several features of these dependencies are notable. A size effect on the conductivity and Hall mobility is evident, i. e. the conductivity and Hall mobility decrease drastically when the film thickness is comparable to the bulk mean free path. Also a damped oscillatory dependence on magnetic field is noted for all transport coefficient ratios. The dependence on the power index is slight, but even this slight dependence can be used to determine the dominant bulk scattering mechanism.

The applicability of this theory is tested by a comparison of its predictions with data reported in the open literature. Qualitative comparisons of the predictions with the measured results of several authors are quite acceptable. The two-layer theory which has been used extensively in interpreting the data is shown to be a good approximation to this theory. A quantitative comparison between theory and experiment is developed for the thickness dependence of the room temperature mobility of InSb films. This comparison shows excellent agreement if the dominant bulk scattering mechanism is polar optical phonon.

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CHAPTER I

INTRODUCTION

A surface is the boundary between two media having different physical properties. Normally the term is applied to a boundary where the change in physical properties occur over a region narrow compared to the spatial extent of the media. Surfaces are usually associated with changes in phase (solid, liquid, gas), chemical composition, and/or crystalline structure.

The study of surface related phenomena extends across all disciplines of science. In physics, surface effects are found in every type of experimental and/or theoretical discipline. In particular, the effect of the surface on electrical carrier transport has recieved its share of interest, spurred in recent years by the rapid development of MOS (Metal-Oxide-Semiconductor) technology.

For the theory of electrical carrier transport in bulk semiconductors one assumes that the semiconductor is an infinite, uniform and periodic structure. This assumption allows the development of a complex theory which is successful in

altered band structure in either the accumulation or the inversion layer.

Two effects can be used to study surface phenomena in semiconductors: the field effect and the size effect. The field effect is the change in the electrical transport produced by a capacitively applied electric field normal to the surface of the semiconductor. The field effect can also be produced by treating the surface of the semiconductor to produce a change in the surface electrostatic potential. The size effect is the change in the electrical transport produced by varying the thickness of a semiconductor layer. The remainder of this dissertation will be concerned with the theory of this size effect in semiconducting films.

The accepted theory for the size effect in a conductor was originally developed by Fuchs² and Sondheimer³. Schrieffer⁴ follows the general analysis of Fuchs and Sondheimer and includes a space-charge potential in the Boltzmann equation to extend the theory to include semiconductors. However, the treatment used by Schrieffer to approximate the space-charge suppresses the bulk current. Other authors⁵⁻⁹ have extended this theory to include magnetic fields by using either a truncated linear or Poisson potential to account for the bulk current, but all treated infinitely thick slabs. Greene,

explaining many aspects of electrical carrier transport in semiconductors. Details of this theory of electrical transport in bulk semiconductors are contained in many excellent texts on the subject¹. Several transport coefficients are defined to describe the movement of carriers in a semiconductor. In general, the carrier motion is affected by both electrical and magnetic fields, and the term galvanomagnetic is used to imply electrical carrier transport in the presence of both fields. Some of the commonly used galvanomagnetic transport coefficients are: conductivity, Hall coefficient, Hall mobility, and magnetoresistivity. Formal definitions of these terms are given in Chapter II.

The surface of a semiconductor has several effects on carrier transport. Free carriers near the surface are scattered by the surface. There is also a change in band structure associated with the transition in media. This band bending can produce either an accumulation or an inversion layer of carriers at the surface. An accumulation layer is the result of an increase in the majority-carrier density at the surface. An inversion layer is the result of an increase in the minority-carrier density at the surface. The effective mass can also be affected by the presence of the surface. This change in the effective mass of the carrier results from the

Frankl, and Zemel¹⁰ developed a solution for the finite slab problem using a Poisson potential. Amith¹¹ treated the finite slab problem using a truncated linear potential. All of these theories assume a scalar effective mass, a constant relaxation time, nondegenerate statistics, spherical energy surfaces, and diffuse surface scattering. In a recent review article, Greene¹² states that a serious shortcoming of these theories is the assumption that the relaxation time is a constant. This dissertation develops an improved theory by including a power law dependence of the relaxation time on absolute carrier velocity.

Experimental measurements of the size effect in semiconductors are complicated by problems encountered in fabricating thin semiconducting films and in measuring the electrical properties of the film once it has been fabricated. Wieder¹³ details the possible errors in measurement procedures. Wieder has reported the measurement of the conductivity mobility in n-type indium antimonide thin films¹⁴, the resistivity and Hall coefficient for indium arsenide epilayers¹⁵, and the Hall coefficient, conductivity, and Hall mobility in heteroepitaxial indium arsenide layers¹⁶. Zemel and Sites¹⁷ have reported the measurement of the Hall coefficient for indium antimonide films. Sites and Wieder¹⁸ have reported the measurement of

the conductivity and Hall coefficient in indium arsenide epilayers. Piotrowska¹⁹ has reported the measurement of the Hall coefficient, conductivity, and Hall mobility of cadmium-mercury-telluride thin films.

A phenomenological two-layer theory is used to interpret much of the experimental data reported by the above authors²⁰. This two-layer theory was originally developed by Neodoluha and Koch²¹, Zemel and Petritz²² further developed this theory. Many et al.²³ detail this theory in their text on the subject of semiconductor surfaces. This two-layer approximation can be justified from the theory developed in this dissertation.

CHAPTER II

THEORY

Definitions

Table I contains a list of the principal symbols used in this dissertation. Vector quantities are indicated by an arrow ($\rightarrow$) over the symbol; a tensor quantity is indicated by a hat ($\hat{}$) over the symbol. Most of these symbols are in common usage in solid state theory. The important galvanomagnetic transport coefficients will now be defined and discussed in detail.

The conductivity (σ) is a measure of the rate of carrier transport per unit electric field per unit area. The electric field produces a force on the carrier which drifts parallel to the electric field. If the crystalline lattice structure was perfectly periodic, the carriers would pass through the crystal in Bloch wave form and the conductivity would be infinite. Random effects such as imperfections and vibrations in the lattice interfere with the passage of the carriers giving rise to a reduced conductivity. These interferences with carrier motion are in general referred to as scattering mechanisms. The surface of a thin film acts as a scattering

TABLE I
SYMBOL DEFINITIONS

Symbol	Definition
a_0	Bohr Radius
B	Magnetic Field
c_l	Longitudinal Acoustic Velocity
C_N	Relaxation Time Proportionality Constant
c	Speed of Light
d	Thickness of Specimen
D_0	Optical Deformation Potential Constant
E	Electrical Field
E_1	Deformation Potential
E_H	Hall Field
$\mathcal{E}$	Carrier Energy
e	Charge on Electron
F	External Force
f	Carrier Distribution
f_0	Carrier Equilibrium Distribution
f_1	Carrier Deviation from Equilibrium
h	Planck's Constants
J	Carrier Current Density
$\mathcal{J}$	Complex Carrier Current Density
k	Boltzmann Constant
K_{∞}	High Frequency Limit of Dielectric Constant
K_s	Static Dielectric Constant
m^*	Effective Mass of Carrier
n	Carrier Density
n_0	Number of Optical Phonons
N	Relaxation Time Power Index
N_1	Ion Density
N_1, N_2, N_3	Parametric Integrals
q	Carrier Charge
R	Hall Coefficient
T	Carrier Temperature
V	Carrier Speed/Velocity
z	Carrier Position with Respect to Surface
Z	Ionization Number
α	Thickness Parameter
β	Magnetic Field Parameter
γ	Bulk Magnetic Field Parameter
$\Delta\rho/\rho_0$	Magnetoresistance
ϵ	Electric Permittivity
μ	Carrier Mobility
τ	Relaxation Time
σ	Carrier Conductivity
ρ	Mass Density
ω	Cyclotron Frequency
ω_0	Optical Phonon Frequency
Subscript B	Bulk Limit
Subscript 0	Zero Magnetic Field Limit
Subscript H	Hall
Subscript C	Conductivity

mechanism. A state of equilibrium between the driving electric force and the resisting scattering mechanisms results. The flow of carriers is measured in terms of a current density (J) which is the charge transported per unit time per unit area. A mathematical definition of the conductivity is given by the equation

$$\vec{J} = \sigma \vec{E} \quad (1)$$

where the conductivity is in general a tensor quantity.

The mobility of a carrier is a measure of the carrier drift velocity per unit electric field. Carrier drift occurs in two principal directions:

- (1) parallel to the applied electric field
- (2) perpendicular to the applied electric and magnetic fields.

Thus, two mobilities can be defined. The conductivity mobility (μ_c) is defined as the conductivity divided by the density of carriers (n) and the charge per carrier (q):

$$\mu_c = \sigma / nq. \quad (2)$$

The Hall mobility (μ_H) is the rate of transfer of carriers perpendicular to the applied electric and magnetic fields. This is defined in terms of the Hall field (E_H) which is the electric field produced by the accumulation at the surface of the carriers drifting perpendicular to the applied fields

$$\vec{E}_H = \mu_H \vec{E} \times \vec{B} \quad (3)$$

The Hall coefficient (R_H) is the proportionality constant between the cross product of the applied magnetic field (B) and the current density (J) and the Hall electric field (E_H)

$$\vec{E}_H = R_H \vec{J} \times \vec{B}. \quad (4)$$

The Hall coefficient is one of the most useful of the transport coefficients, since measurement of the Hall coefficient is indicative of both the type and density of carriers. Combining (1) and (4) one sees that

$$\mu_H = R\sigma. \quad (5)$$

Thus, the carrier Hall mobility can be inferred from a measurement of the Hall coefficient and the conductivity.

The transverse magnetoresistance is the relative change in the current density produced by the application of a magnetic field perpendicular to the current density

$$\frac{\Delta\rho}{\rho_0} = 1 - \frac{J(B)}{J(0)}, \quad (6)$$

In an isotropic medium an increase in resistivity is understood in terms of a curvature of carrier paths produced by the magnetic field. This explanation appears reasonable for transverse magnetoresistance; however, it cannot explain the observed longitudinal magnetoresistance. Thus, a treatment of the magnetic effects on the constant energy surfaces is needed for a complete theory of magnetoresistance.

For the case of a constant relaxation time (τ) and spherical energy surfaces, the expressions for the transport coefficients can be simplified to:

$$\sigma = q\tau/m^* \quad (7)$$

$$\mu_c \approx \mu_H = \tau/m^*nc \quad (8)$$

$$R_H = -1/nqc \quad (9)$$

$$\Delta\rho/\rho_0 = 0 \quad (10)$$

where c is the speed of light and m^* is the effective carrier mass.

Background and Assumptions

To develop a solvable theory for the electrical transport properties of a semiconducting film, several simplifying assumptions will be needed. The linearized Boltzmann transport equation will be used as the basis for the development of this theory. The semiconductor will be assumed to be bounded and nondegenerate. The energy surfaces will be assumed to be spherical. The conduction and valance bands will be assumed to be flat at the surface of the semiconductor. The carriers will be assumed to scatter diffusely at the surface and to have an equilibrium distribution described by classical Boltzmann statistics. The relaxation time will be assumed to have a power law dependence on the absolute carrier velocity.

A theory for the electrical transport in a semiconducting film must treat the large number of carriers which are present in the semiconductor. Obviously statistical procedures are needed since specifying the motion of each of these carriers would require an impossible amount of information. Thus a statistical distribution is introduced which specifies the probability of finding a carrier in the semiconductor having a position and momentum within some small range²⁴. The Boltzmann equation is used to find this distribution function for a particular situation²⁵,

$$\frac{\partial f}{\partial t} + \vec{V} \cdot \nabla_{\vec{r}} f + \frac{\vec{F}}{m^*} \cdot \nabla_{\vec{p}} f = \left(\frac{\partial f}{\partial t} \right)_c \quad (11)$$

where f is the carrier distribution function, $\vec{V}$ is the carrier velocity, $\vec{F}$ is the external force, m^* is the effective mass of the carrier, $\nabla_{\vec{r}, \vec{p}}$ is the gradient with respect to the position or momentum of the carrier, t is the time, and $\left(\frac{\partial f}{\partial t} \right)_c$ is the collision integral due to the scattering mechanisms. It is assumed that the carrier executes a classical motion, thus it is not valid for high fields or band-to-band transitions. This equation is in general too difficult to solve and additional simplifying assumptions must be made to allow solution.

The first of these assumptions is that a condition of

of steady state has been reached, i.e.

$$\frac{\partial f}{\partial t} = 0, \quad (12)$$

A second assumption is that the relaxation time approximation holds for the collision integral. This approximation assumes that the collision integral to first order is proportional to the deviation from equilibrium,

$$\left(\frac{\partial f}{\partial t} \right)_c = -\frac{f - f_0}{\tau} \quad (13)$$

where f_0 is the carrier equilibrium distribution and τ is the relaxation time. The general collision term in the Boltzmann transport equation can be shown to reduce to this relaxation time form for two types of collisions²⁶. The first of these is the randomizing collision. In a randomizing collision momentum is conserved and after the collision the carrier has a random direction of motion. Nonpolar optical phonon²⁷ scattering is of the randomizing type. The second type of collision for which the collision term can be reduced to relaxation time form is an elastic collision. For an elastic collision the energy of the carrier is conserved. Since the energy of acoustic phonons may be considered very small compared to that of the carriers unless the carrier temperature is very low, acoustic phonon²⁸ scattering is approximately elastic. Piezoelectric and impurity scattering are also

elastic. In general polar optical phonon scattering is neither randomizing or elastic. However if it is assumed that the carrier energy is much larger than the energy of an optical phonon, polar optical phonon scattering may be considered elastic.

There are several other assumptions which are used for the present theory. The carriers will be assumed to have a scalar, constant effective mass. This assumption implies that the carriers always stay in the same band so that the motion can be described in terms of a fictitious particle moving in the external fields only. This fictitious particle has an effective mass which is different from the free electron mass. Also the carrier energy surfaces in momentum space are assumed to be spherical, i.e.

$$\epsilon = \frac{\hbar^2 K^2}{2m^*} \quad (14)$$

where m^* is the effective carrier mass, K is the carrier wave vector, ϵ is the carrier energy, and $\hbar$ is Planck's constant. And it will be assumed that the semiconductor is nondegenerate. Thus the classical Boltzmann distribution is used to describe equilibrium,

$$f_0 = n \left(\frac{m^*}{2\pi kT} \right)^{3/2} \exp \left(-\frac{m^* v^2}{2kT} \right) \quad (15)$$

where T is the temperature and k is the Boltzmann constant.

Since only ohmic transport is considered, the Boltzmann equation is linearized. To perform this linearization the carrier distribution is assumed to be approximately equal to the equilibrium distribution,

$$f = f_0 + \vec{V} \cdot \vec{f}_1 \quad (16)$$

where $\vec{V} \cdot \vec{f}_1$ is the deviation of the distribution from equilibrium. Substituting (12), (13), and (16) into (11) gives

$$\vec{V} \cdot \nabla_r (f_0 + \vec{V} \cdot \vec{f}_1) + \frac{\vec{F}}{m^*} \cdot \nabla_p (f_0 + \vec{V} \cdot \vec{f}_1) = \frac{\vec{V} \cdot \vec{f}_1}{\tau} \quad (17)$$

To linearize this equation one ignores the higher order terms in the applied fields giving

$$\vec{V} \cdot \nabla_r (\vec{V} \cdot \vec{f}_1) + \frac{f_0 \vec{F} \cdot \vec{V}}{kT} + \frac{\vec{F} \cdot \vec{f}_1}{m^*} - \frac{\vec{V} \cdot \vec{f}_1}{\tau} = 0. \quad (18)$$

This is the linearized, relaxation time form of the Boltzmann transport equation which will be solved in this dissertation to derive the electrical transport coefficients for a semi-conducting film.

Next the assumption which differentiates the present theory of electrical transport in thin semiconducting films from other similar theories is made. This assumption concerns the dependence of the carrier relaxation time on the carrier energy or velocity. It will be assumed in this dissertation that the relaxation time has a power law dependence on the carrier velocity. This assumption can be expressed in terms

of a power index (N) and a proportionality constant (C_N) as

$$\tau = C_N V^N. \quad (19)$$

This has been shown to be reasonable for several types of scattering mechanisms²⁹. Table II lists the power index and proportionality constant for several scattering mechanisms³⁰.

The final assumptions, which are needed to allow solution for the electrical transport coefficients in a thin semiconducting film, concern the effect of the surface on the transport coefficients. The surface affects carrier motion in two ways³¹:

- (1) It acts as a scatterer.
- (2) It changes the band structure.

Assumptions have to be made about both of these effects in order to allow a theoretical solution.

There are two extremes for the scattering of the free carriers by the surface: diffuse (random) or specular (perfect). Diffuse scattering implies that the carriers emerge from the surface with a equilibrium distribution, having lost all memory of the distribution before scattering. This type of scattering decreases the mobility of the free carriers drifting within a mean free path from the surface. In specular scattering the component of velocity parallel to the surface and the energy are unaffected by the scattering.

TABLE II
RELAXATION TIME CONSTANTS FOR VARIOUS
SCATTERING MECHANISMS

Scattering Mechanism	Power Index N	Proportionality Constant CN
Acoustic Phonon	-1	$\frac{\pi \hbar^4 \rho c_q^2}{E_I^2 m^{*2} kT}$
Piezoelectric	1	$\frac{2\pi \rho \hbar^2 c_q^2 \epsilon^2}{q^2 \hbar^2 kT}$
Nonpolar Optical Phonon	1	$\frac{2\pi \hbar \rho \omega_0}{m^{*2} D_0^2 (2n_0 + 1)}$
Polar Optical Phonon	1	$\frac{4\pi \epsilon_0 \hbar K_\infty K_S}{q^2 \omega_0 (2n_0 + 1) (K_S - K_\infty)}$
Ionized Impurity	3	$\frac{16\pi m^{*2} \epsilon^2}{Z^2 q^4 N_I c}$
Neutral Impurity	0	$\frac{m^{*}}{20 \hbar N_I a_0}$

For the assumed spherical energy surfaces and scalar effective mass, the reflection of a carrier from a specular surface only results in a reversal of the sign of the component of velocity normal to the surface. Thus there is no effect on the transport of the carriers if the surface scattering is specular.

In this dissertation the surface scattering will be assumed to be diffuse. While this assumption is obviously a questionable to the real surface scattering, it provides the simplest approach which will involve an effect of the surface scattering on electrical transport. Since size effects and field effects are observed, totally specular scattering can not be realistic. The actual surface scattering mechanisms such as trapped surface charges or surface roughness must produce a complicated scattering function which is best approximated by diffuse rather than specular scattering.

At a free surface of a semiconductor the sudden change in the properties produces a region where the electrostatic potential varies. This region is referred to as the space-charge region. A detailed knowledge of the characteristics of this region is essential to any theory of electrical properties of the surface. In general the shape of this potential barrier can be determined by solving Poisson's equation. The excess carrier densities at the surface can then be determined by numerical integration. If there are excess majority

carriers in the space-charge region, it is termed an accumulation layer. When the excess carriers are minority type, one has a depletion or inversion layer.

The presence of a space-charge region at the surface of a semiconductor affects the band structure. The new band structure is normally determined by superimposing the macroscopic space-charge potential on the bulk band structure. This produces energy bands which are curved at the surface of the semiconductor. In thin films this band bending can be neglected since for distances small in comparison to the Debye length the solution to Poisson's equation is approximately a constant. The term flat-banded is used to indicate that there is no curvature of the band structure at the surface. In this dissertation the semiconductor will be assumed to be flat-banded which implies that the carrier density is independent of position.

Solution

The linearized Boltzmann equation in relaxation time form is solved for a bounded, nondegenerate semiconducting film. The assumptions used in this solution were detailed in the previous section. The energy surfaces are assumed to be spherical with a scalar effective mass. The relaxation time is assumed to have a power law dependence on absolute carrier

velocity. The surface scattering is assumed to be diffuse. The semiconductor is assumed to be flat-banded at the surface, i.e. the carrier density is assumed to be independent of position. The equilibrium statistics for the carriers is assumed to be the classical Boltzmann distribution function.

The geometry of the specimen and applied fields is shown in Figure 1. The magnetic field (B) is applied parallel to the thin dimension of the specimen (z -direction). The electric field (E) is applied perpendicular to the thin dimension of the specimen (x -direction). A Hall electric field (E_H) is produced by the accumulation of the carriers at the specimen surfaces which are parallel to both the applied electric and magnetic field (y -direction). The external fields produce a force on the carriers which is given by

$$\vec{F} = q (\vec{V} \times \vec{B} / c + \vec{E} + \vec{E}_H). \quad (20)$$

Substituting into (18) gives

$$\nabla_r (\vec{V} \cdot \vec{f}_1) + \frac{f_0 q}{kT} (\vec{E} + \vec{E}_H) + \frac{q}{m^* c} \vec{B} \times \vec{f}_1 = \frac{\vec{f}_1}{\tau}. \quad (21)$$

If one now assumes that the specimen is of infinite extent in the x - and y -directions, the distribution function will be independent of x and y . And (21) becomes

$$\frac{\vec{f}_1}{\tau} + v_z \frac{\partial \vec{f}_1}{\partial z} - \frac{q f}{kT} (\vec{E} + \vec{E}_H) + \frac{q}{m^* c} (\vec{B} \times \vec{f}_1) = 0. \quad (22)$$

Figure 1. Geometry of the specimen in the external fields.

This vector equation represents three coupled equations for the three components of the deviation from equilibrium. These equations can most easily be solved by the introduction of a complex combination of two of these components, i.e.

$$\mathcal{F} = f_{1x} + i f_{1y}. \quad (23)$$

This uncouples (22) into two equations:

$$\frac{f_{1z}}{\tau} + v_z \frac{\partial f_{1z}}{\partial z} = 0. \quad (24)$$

$$\left(\frac{1}{\tau} + i \frac{qB}{m^*c} \right) \mathcal{F} + v_z \frac{\partial \mathcal{F}}{\partial z} - \frac{qf_0}{kT} (E + i E_H) = 0. \quad (25)$$

which are the differential equations for the exponential function. The general solution to (24) is

$$f_{1z} = a \exp(-z/v_z \tau) \quad (26)$$

where a is a real constant. The general solution to (25) is

$$\mathcal{F} = b \exp(-z(1/\tau + i\omega)/v_z) + \frac{f_0 q (E + i E_H)}{kT(1/\tau + i\omega)} \quad (27)$$

where ω is the cyclotron frequency and b is a complex constant. The cyclotron frequency (ω) is defined by

$$\omega = \frac{qB}{m^*c}. \quad (28)$$

The constants in (26) and (27) are determined by applying appropriate boundary conditions. The assumed diffuse scattering at the surface implies that carriers which are leaving a surface have no deviation from equilibrium. This is referred

to as Fuchs boundary conditions. Carriers leaving the surface at $z = d/2$ have a negative value for the z -component of the velocity. Carriers leaving the opposite surface have a positive z -component of velocity. Thus, two values of the constants are found, one for each sign of the z -component of velocity. Superscripts will be used to distinguish these. The constants for the positive component are found by setting (26) and (27) equal to zero at $z = -d/2$ giving:

$$a^+ = 0 \quad (29)$$

$$b^+ = - \frac{f_0 q (E + \mathcal{L} E_H)}{kT(1/\tau + \mathcal{L} \omega)} \exp(d(1/\tau + \mathcal{L} \omega)/2V_z). \quad (30)$$

The constants for the negative component are found by setting (26) and (27) equal to zero at $z = d/2$ giving

$$a^- = 0 \quad (31)$$

$$b^- = b^+(-V_z). \quad (32)$$

Substituting these values into (26) and (27) gives for the deviation from equilibrium:

$$f_{1z} = 0 \quad (33)$$

$$\mathcal{F}^\pm = \frac{f_0 q (E + \mathcal{L} E_H)}{kT(1/\tau + \mathcal{L} \omega)} (1 - \exp(-(z \pm d/2)(1/\tau + \mathcal{L} \omega)/V_z)). \quad (34)$$

The current density produced by this distribution of the carriers is calculated by performing the following integral

$$\vec{J} = q \int \vec{V} f d^3V. \quad (35)$$

This integral is zero for the equilibrium distribution, thus the only contribution to the current density is due to the deviation from equilibrium. So (35) becomes

$$\vec{J} = q \int \vec{V} (V_x f_{1x} + V_y f_{1y}) d^3V. \quad (36)$$

The x- and y-components of the deviation are given by the real and imaginary parts of the complex deviation given in (34). Several of these integrations can be eliminated by the fact that the integral of an odd function of V_x or V_y is zero, since

$$\int_{-\infty}^{\infty} O(x) dx = 0 \quad (37)$$

where $O(x)$ is an odd function of x . Since f_{1x} and f_{1y} depend on V_x and V_y through the equilibrium distribution function, they are even functions of V_x and V_y . Thus, any of the integrals which has an odd power of V_x or V_y is zero. This results in the following equations for the current densities:

$$J_x = q \int V_x^2 f_{1x} d^3V \quad (38)$$

$$J_y = q \int V_y^2 f_{1y} d^3V \quad (39)$$

$$J_z = 0. \quad (40)$$

The current densities given in (38-39) are dependent on the z-position. Experimentally one measures an average value of the current densities, so these equations must be averaged over z. This average is given by

$$\bar{J}_x = \frac{q}{d} \int_{-d/2}^{d/2} \int V_x^2 f_{1x} d^3V dz \quad (41)$$

$$\bar{J}_y = \frac{q}{d} \int_{-d/2}^{d/2} \int V_y^2 f_{1y} d^3V dz. \quad (42)$$

In terms of the complex deviation from equilibrium these equations can be written

$$\bar{J}_{x,y} = \left| \frac{RE}{IM} \right| \int_{-d/2}^{d/2} \int V_{x,y}^2 \mathcal{F}^{\pm} d^3V dz. \quad (43)$$

Thus both non-zero current densities can be found from the integral of the complex deviation from equilibrium. A complex current density can be defined as

$$\mathcal{J} = J_x + i J_y. \quad (44)$$

Substituting (43) into (44) gives

$$\mathcal{J} = \frac{q}{d} \int_{-d/2}^{d/2} \int V_{x,y}^2 \mathcal{F}^{\pm} d^3V dz. \quad (45)$$

The integration over z can be performed giving

$$\mathcal{J} = \frac{2q^2(E + E_H)}{dkT} \int \frac{V_{x,y}^2 f_0}{1/\tau + i\omega} \left[d - \frac{V_z}{1/\tau + i\omega} \{ 1 - \exp(-d(1/\tau + i\omega)/V_z) \} \right] d^3V. \quad (46)$$

The superscript + indicates integration over the positive values of the z-component of velocity only since after averaging over z the integrals over opposite signs of the z-component are equal.

Transforming into spherical coordinates for the velocity and substituting for the relaxation time from (19) and the equilibrium from (15) gives for (46)

$$\mathcal{G} = \frac{2q^2(E+\lambda E_H)}{dkT} \int_0^\infty \int_0^{\pi/2} \int_0^{2\pi} V^2 \left[\frac{\cos^2 \phi}{\sin^2 \phi} \right] \sin^3 \theta \frac{n \left(\frac{m^*}{2\pi kT} \right)^{3/2} \exp \left\{ -\frac{m^* V^2}{kT} \right\}}{1/C_N V^N + \lambda \omega} \left(d - \frac{V \cos \theta}{1/C_N V^N + \lambda \omega} \left[1 - \exp \left\{ -d(1/C_N V^N + \lambda \omega)/V \cos \theta \right\} \right] \right) d\phi \, d\theta \, dV. \quad (47)$$

The integration over phi (ϕ) can be performed giving

$$\mathcal{G} = \frac{2nq^2 \pi (E+\lambda E_H) m^{*3/2}}{dkT (2\pi kT)^{3/2}} \int_0^\infty \int_0^\pi \frac{V^4 \sin^3 \theta \exp(-m^* V^2 / 2kT)}{1/C_N V^N + \lambda \omega} \left(1 - \frac{V \cos \theta}{1/C_N V^N + \lambda \omega} \left[d - \exp \left\{ -d(1/C_N V^N + \lambda \omega)/V \cos \theta \right\} \right] \right) d\theta \, dV. \quad (48)$$

This integral can be reduced to dimensionless form by introducing several parameters:

(1) Integration Variable

$$x = V \sqrt{m^*/2kT} \quad (49)$$

(2) Thickness Ratio

$$\alpha = \frac{d}{C_N} \left(\frac{m^*}{2kT} \right)^{\frac{N+1}{2}} \quad (50)$$

(3) Magnetic Field Parameter

$$\beta = \omega d \sqrt{m^*/2kT} \quad (51)$$

(4) Constant Multiplier

$$C = \frac{4q^2 nd}{\sqrt{2k\pi T m^*}} \quad (52)$$

Substituting into (48) gives

$$\oint = C(E + iE_H) \int_0^\infty \int_0^{\pi/2} \frac{x^4 \exp(-x^2)}{\alpha/x^N + i\beta} \left[1 - \frac{x \cos\theta}{\alpha/x^N + i\beta} \left\{ 1 - \exp\left\{ -(\alpha/x^N + i\beta)/x \cos\theta \right\} \right\} \right] \sin^3\theta \, d\theta \, dx. \quad (53)$$

The integration over theta (θ) can be performed for two parts of this integral giving

$$\begin{aligned} &= C(E + E_H) \frac{2}{3} \int_0^\infty \frac{x^4 \exp(-x^2)}{\alpha/x^N + i\beta} \, dx - \frac{1}{4} \int_0^\infty \frac{x^5 \exp(-x^2)}{(\alpha/x^N + i\beta)^2} \, dx \\ &+ \int_0^\infty \int_0^{\pi/2} \frac{x^5 \exp\{-x^2 - (\alpha/x^N + i\beta)/x \cos\theta\}}{(\alpha/x^N + i\beta)^2} \cos\theta \sin^3\theta \, d\theta \, dx. \end{aligned} \quad (54)$$

Thus there are three parametric integrals which must be evaluated in order to determine the current density:

$$N1(\alpha, \beta, N) = \int_0^\infty \frac{x^4 \exp(-x^2)}{\alpha/x^N + i\beta} \, dx \quad (55)$$

$$N2(\alpha, \beta, N) = \int_0^\infty \frac{x^5 \exp(-x^2)}{(\alpha/x^N + i\beta)^2} \, dx \quad (56)$$

$$N3(\alpha, \beta, N) = \int_0^\infty \int_0^{\pi/2} \frac{x^5 \exp\{-x^2 - (\alpha/x^N + i\beta)/x \cos\theta\}}{(\alpha/x^N + i\beta)} \cos\theta \sin^3\theta \, d\theta \, dx. \quad (57)$$

In terms of these integrals the complex current is given by

$$J = C(E + iE_H)(2 N1/3 - N2/4 + N3). \quad (58)$$

Separating this sum of the integrals into a real and imaginary part gives

$$\begin{bmatrix} \text{Re} \\ \text{Im} \end{bmatrix} = \begin{bmatrix} \text{Real part} \\ \text{Imaginary part} \end{bmatrix} (2 N1/3 - N2/4 + N3). \quad (59)$$

Thus the x- and y-components of the current density are given by

$$\bar{J}_x = C(E \text{ Re} - E_H \text{ Im}) \quad (60)$$

$$\bar{J}_y = C(E \text{ Im} + E_H \text{ Re}). \quad (61)$$

The experimental conditions dictate that the y-component of current is zero, thus the Hall electric field can be determined in terms of the applied fields from (61) giving

$$E_H = -E \text{ Im}/\text{Re}. \quad (62)$$

Substitution into (60) gives

$$\bar{J}_x = C E (\text{Re} + \text{Im}^2/\text{Re}). \quad (63)$$

Now the four transport coefficients can be evaluated.

From (1) the conductivity is given by

$$\sigma = C (\text{Re} + \text{Im}^2/\text{Re}). \quad (64)$$

The Hall coefficient as defined in (4) is given by

$$R_H = \frac{-\text{Im}}{C B (\text{Re}^2 + \text{Im}^2)}, \quad (65)$$

The Hall mobility as defined in (5) is given by

$$\mu_H = - \frac{\text{Im}}{B \text{ Re}}, \quad (66)$$

The magnetoresistance as defined in (6) is given by

$$\frac{\Delta \rho}{\rho_0} = 1 - \frac{\text{Re}^2 + \text{Im}^2}{\text{Re} \text{ Re}_0} \quad (67)$$

where

$$\text{Re}_0 = \lim_{B \rightarrow 0} \text{Re}. \quad (68)$$

Thus all of the transport coefficients can be calculated in terms of the parametric integrals defined in (55), (56), and (57).

CHAPTER III

EVALUATION OF PARAMETRIC INTEGRALS

The parametric integrals defined in (55), (56), and (57) must be evaluated in order to determine the transport coefficients. In general, none of these integrals can be evaluated exactly and numerical methods must be used. The zero and asymptotic limits of these integrals can be calculated in terms of well known functions. These limits can be used to verify the accuracy of the numerical solutions.

Zero and Asymptotic Limits of the Parametric Integrals

Zero-Magnetic-Field Limit

As the magnetic field goes to zero, the magnetic parameter goes to zero. So neglecting higher order terms in the magnetic parameter, (55), (56), and (57) become:

$$N1(\alpha, 0, N) = \left(\frac{N+3}{2}\right)! / 2\alpha - \frac{\beta}{\alpha^2} \left(\frac{2N+3}{2}\right)! \quad (69)$$

$$N2(\alpha, 0, N) = (N+2)! / 2\alpha^2 - \frac{\beta}{\alpha^3} \left(\frac{3N+4}{2}\right)! \quad (70)$$

$$N3(\alpha, 0, N) = \frac{1}{\alpha^2} \int_0^\infty \int_0^{\pi/2} x^{2N+5} \exp(-x^2 - \alpha/x^{N+1} \cos\theta) \cos\theta \sin^3\theta \, d\theta \, dx. \quad (71)$$

Thus two of the parametric integrals can be evaluated exactly for the zero value of the magnetic field. The third integral can only be evaluated for the infinite limit for the thickness. However this integral can be written in terms of the well known exponential integral defined by³²

$$E_n(x) = \int_1^{\infty} \exp(-xt)/t^n dt \quad (72)$$

where x is a real constant. Thus (71) becomes

$$N3 = \frac{1}{\alpha^2} \int_0^{\infty} x^{2N+5} \exp(-x^2) \{E_3(\alpha/x^{N+1}) - E_5(\alpha/x^{N+1})\} dx. \quad (73)$$

This can be further reduced in two limits: infinite and zero thickness.

Infinite thickness limit. - The asymptotic limit of the exponential integral is given by³³

$$E_n(x) = \frac{\exp(-x)}{x} \left\{ 1 - \frac{n}{x} + \dots \right\}. \quad (74)$$

So asymptotically

$$E_3 - E_5 \cong \frac{2\exp(-x)}{x}. \quad (75)$$

and in the asymptotic limit (73) becomes

$$N3 \cong \frac{2}{\alpha^4} \int_0^{\infty} x^{4N+7} \exp(-x - \alpha/x^{N+1}) dx. \quad (76)$$

Asymptotically the third parametric integral decreases faster than the fourth power of the thickness ratio and is negligible in comparison to the other parametric integrals.

Zero thickness limit. - The zero thickness limit of exponential integral is given by³⁴

$$E_n = \frac{(-1)^{n-1}}{(n-1)!} \left\{ -\ln(x) - \gamma + \sum_{m=1}^{n-1} \frac{1}{m} \right\} - \sum_{m=n-1}^{\infty} \frac{(-x)^m}{(m-n+1)!} \quad (77)$$

Thus

$$E_3 - E_5 = \frac{1}{4} - \frac{2x}{3} + \frac{x^2}{2} \{-\gamma - \ln(x) + 1\} + \dots \quad (78)$$

Substituting into (73) gives

$$N_3 = \{-\gamma + 1 - \ln(\alpha)\}/4 - \left(\frac{N+1}{2}\right)! / 3\alpha + (N+1)! / 8\alpha^2 + \left(\frac{N+1}{2}\right) \int_0^{\infty} x^3 \ln(x) dx. \quad (79)$$

Large Magnetic Field

The asymptotic limit in the magnetic field parameter represents the high magnetic field limit of the parametric integrals. This limit is not applicable to any real situation since the present theory is limited to low fields, but it can be used to check the accuracy of the numerical results. The asymptotic limit of the first two integrals can be easily determined to be:

$$N_1 = \alpha \left(\frac{1-N}{2}\right)! / 2\beta^2 - (\frac{1}{2})! / 2\beta \quad (80)$$

$$N_2 = -1/2\beta^2 - \alpha/\beta^3 \quad (81)$$

The third parametric integral can be expanded asymptotically by the introduction of the modified exponential integral

defined as³⁵

$$E_n(z) = \int_1^{\infty} \frac{\exp(-zt)}{t^n} dt \quad (82)$$

where z is an imaginary constant. The third parametric integral can be written in terms of the modified exponential integral as

$$N3 = \int_0^{\infty} \frac{x^5 \exp(-x^2)}{(\alpha/x^N + \beta)^2} \{E_3(z) - E_5(z)\} dx \quad (83)$$

where

$$z = \alpha/x^{N+1} + \beta/x. \quad (84)$$

The asymptotic limit of the modified exponential integral is given by³⁶

$$E_n(z) = \exp(-z) \sum \frac{(-1)^m (n+m-1)!}{x^m (n-1)!} \quad (85)$$

Thus (83) becomes to lowest order

$$N3 = 2 \int_0^{\infty} \frac{x^7 \exp(-x^2 - \alpha/x^{N+1} - \beta/x)}{(\alpha/x^N + \beta)^4} dx \quad (86)$$

which can be reduced to

$$\begin{aligned} N3 = & \frac{2}{\beta^4} \int_0^{\infty} x^7 \exp(-x^2 - \alpha/x^{N+1} - \beta/x) dx \\ & - \frac{8\alpha}{\beta^5} \int_0^{\infty} x^{7-N} \exp(-x^2 - \alpha/x^{N+1} - \beta/x) dx. \end{aligned} \quad (87)$$

The third integral decreases faster than the inverse fourth power of the magnetic field parameter, so it is negligible in comparison to the other integrals.

Bulk Limit

The bulk limit is the limit as the thickness becomes infinite. Therefore both the thickness and the magnetic field parameters become infinite. However the ratio of the magnetic field parameter to the thickness parameter is independent of the thickness, so a new parameter is introduced

$$\gamma = \beta/\alpha = \frac{qB}{m^*c} C_N \left(\frac{2kT}{m^*} \right)^{N/2}. \quad (88)$$

Substituting this into (55), (56), and (57) gives

$$N1 = \frac{1}{\alpha} \int_0^{\infty} \frac{x^4 \exp(-x^2)}{(1/x^N + \gamma)} dx \quad (89)$$

$$N2 = \frac{1}{\alpha^2} \int_0^{\infty} \frac{x^5 \exp(-x^2)}{(1/x^N + \gamma)^2} dx \quad (90)$$

$$N3 = \frac{1}{\alpha^2} \int_0^{\infty} \frac{x^5 \exp(-x^2 - \alpha(1/x^N + \gamma)/x \cos \theta)}{(1/x^N + \gamma)} d\theta dx. \quad (91)$$

Thus in the bulk limit the second and third parametric integrals are negligible in comparison to the first parametric integral which is proportional to the inverse of the thickness. Thus in the bulk limit

$$Re_b = \frac{1}{\alpha} \int_0^{\infty} \frac{x^{4-N} \exp(-x^2)}{1/x^{2N} + \gamma^2} dx \quad (92)$$

$$Im_b = -\frac{\gamma}{\alpha} \int_0^{\infty} \frac{x^4 \exp(-x^2)}{1/x^{2N} + \gamma^2} dx, \quad (93)$$

The zero magnetic field limits of these integrals is given by

$$\text{Re}_{b,0} = \left(\frac{N+3}{2} \right) !/2\alpha \quad (94)$$

$$\text{Im}_{b,0} = - \left(\frac{2N+3}{2} \right) !/2\alpha. \quad (95)$$

Numerical Solutions

The computer programming to perform the numerical evaluation of the parametric integrals was developed using FORTRAN IV. These programs are given in Appendix A. These programs were executed on a Hewlett Packard 2100 minicomputer. The complete results of this numerical analysis are given in Appendix B. Table III lists some representative values of these integrals which can be compared with the asymptotic and zero limits developed in the last section. This comparison shows good agreement of the numerically calculated values at the limiting values of the thickness and magnetic field parameters. In Appendix C an error analysis is given to insure that the calculated values are accurate to the significant digits quoted.

TABLE III
TYPICAL VALUES OF PARAMETRIC INTEGRALS

N	α	β	N1		N2		N3	
			Real	Imaginary	Real	Imaginary	Real	Imaginary
1	1	0	1	0	3	0	3.984E-1	0
		.1	9.711E-1	-1.606E-1	2.668	-1.066	3.322E-1	-1.842E-1
		1	2.982E-1	-4.361E-1	-3.164E-1	-6.019E-1	-7.423E-2	4.971E-4
		1000	5.000E-7	-6.646E-4	-1.000E-6	-1.329E-9	1.309E-7	3.243E-7
	10	0	0.1	0	0.03	0	2.003E-4	0
		.1	9.997E-2	-1.661E-3	2.996E-2	-1.162E-3	1.990E-4	-2.197E-5
		1	9.711E-2	-1.606E-2	2.668E-2	-1.066E-2	8.645E-5	-1.646E-4
		1000	4.999E-6	-6.646E-4	-9.998E-7	-1.329E-8	5.326E-9	6.591E-9
	100	0	0.01	0	0.0003	0	1.768E-11	0
		.1	1.000E-2	-1.662E-5	3.000E-4	-1.163E-6	1.172E-11	-4.704E-13
		1	9.997E-3	-1.661E-4	2.996E-4	-1.162E-5	1.078E-11	-4.569E-12
		1000	4.952E-5	-6.603E-4	-9.852E-7	-1.312E-7	1.490E-14	-1.405E-14
3	1	0	3	0	60	0	13.43	0
		.1	1.897	-1.178	2.039	-2.064E+1	-3.429E-1	-4.439
		1	1.859E-1	-5.253E-1	-7.032E-1	-3.808E-1	-9.821E-2	8.113E-2
		1000	4.998E-7	-6.646E-4	-1.000E-6	-8.877E-10	-2.396E-8	1.355E-7
	10	0	0.3	0	0.6	0	7.290E-2	0
		.1	2.966E-1	-2.552E-2	5.474E-1	-1.683E-1	6.177E-2	-2.985E-2
		1	1.897E-1	-1.178E-1	2.039E-2	-2.064E-1	-1.545E-2	-1.006E-2
		1000	4.865E-6	-6.642E-4	-9.996E-7	-8.726E-9	3.891E-8	2.033E-8
	100	0	0.03	0	0.006	0	5.715E-5	0
		.1	3.000E-2	-2.616E-4	5.994E-3	-1.819E-4	5.713E-5	-6.521E-6
		1	2.966E-2	-2.552E-3	5.474E-3	-1.683E-3	2.336E-5	-4.493E-5
		1000	3.873E-5	-6.560E-4	-9.854E-7	-7.834E-8	1.042E-9	2.665E-10
-1	1	0	0.5	0	0.5	0	1.962E-2	0
		.1	4.952E-1	-4.366E-2	4.858E-1	-8.592E-2	1.804E-2	-5.593E-3
		1	2.982E-1	-2.285E-1	8.722E-2	-2.704E-1	-6.126E-3	-6.141E-3
		1000	1.000E-6	-6.646E-4	-1.000E-6	-3.323E-9	1.682E-7	-8.532E-8
	10	0	0.05	0	0.005	0	2.295E-9	0
		.1	4.999E-2	-4.438E-4	4.999E-3	-8.875E-5	2.227E-9	-2.536E-10
		1	4.952E-2	-4.366E-3	4.858E-3	-8.592E-4	8.957E-10	-1.812E-9
		1000	9.997E-6	-6.645E-4	-9.991E-7	-3.321E-8	1.622E-11	2.993E-11
	100	0	0.005	0	0.00005	0	0.000	0
		.1	5.000E-3	-4.439E-6	5.000E-5	-8.878E-8	0.000	0.000
		1	5.000E-3	-4.438E-5	4.999E-5	-8.875E-7	0.000	0.000
		1000	9.711E-5	-6.486E-4	-9.156E-7	-3.105E-7	0.000	0.000
0	1	0	6.647E-1	0	1	0	7.328E-2	0
		.1	6.580E-1	-6.580E-2	9.705E-1	-1.961E-1	6.919E-2	-2.164E-2
		0	3.323E-1	-3.323E-1	0.000	-5.000E-1	-2.777E-2	-1.812E-2
		1000	6.646E-7	-6.646E-4	-1.000E-6	-2.000E-9	1.525E-7	2.270E-7
	10	0	6.647E-2	0	0.01	0	1.419E-6	0
		.1	6.646E-2	-6.646E-4	9.997E-3	-2.000E-4	1.414E-6	-1.069E-7
		1	6.580E-2	-6.580E-3	9.705E-3	-1.961E-3	1.016E-6	-9.529E-7
		1000	6.646E-6	-6.646E-4	-9.997E-7	-2.000E-8	-1.903E-10	5.169E-10
	100	0	6.647E-3	0	0.0001	0	1.609E-21	0
		.1	6.646E-3	-6.646E-6	1.000E-4	-2.000E-7	3.924E-22	-1.129E-23
		1	6.646E-3	-6.646E-5	9.997E-5	-2.000E-6	3.833E-22	-1.134E-22
		1000	6.580E-5	-6.580E-4	-9.705E-7	-1.961E-7	-2.716E-23	7.796E-24

CHAPTER IV

TRANSPORT COEFFICIENT RATIO

After the values of the parametric integrals were calculated numerically for representative values of the thickness ratio (α), the magnetic field parameter (β), and the power index (N), the values of the transport coefficients are found using (64), (65), (66), and (67). The magnetoresistance is already a unitless ratio and it is convenient to express the remaining transport coefficients as unitless ratios. This is accomplished by dividing each of the transport coefficients by its bulk, zero-magnetic-field limit. The programming developed to perform these calculations is given in Appendix A. After the transport coefficients were calculated, a Tektronics 4051 Graphics Minicomputer was used to produce graphs of the dependence of each of the ratios on the parameters. The graphics programming is also detailed in Appendix A.

Bulk, Zero-Magnetic-Field Limit of Transport Coefficients

Using the bulk and zero-magnetic-field limits of the parametric integrals given in (94) and (95), the bulk and zero-magnetic-field limit of the transport coefficients can

be found. The conductivity given in (64) becomes in this limit

$$\sigma_{b,0} = \frac{1}{3} \left(\frac{N+3}{2} \right)! \lim_{d \rightarrow \infty} \frac{C}{\alpha} . \quad (96)$$

The Hall coefficient given in (65) becomes in this limit

$$R_{H,b,0} = \frac{2 \left(\frac{2N+3}{2} \right)!}{C \left(\frac{N+3}{2} \right)!^2} \lim_{\substack{B \rightarrow 0 \\ d \rightarrow \infty}} \frac{\beta}{B} . \quad (97)$$

The Hall mobility given in (66) becomes in this limit

$$\mu_{H,b,0} = \frac{\left(\frac{2N+3}{2} \right)!}{\left(\frac{N+3}{2} \right)!} \lim_{B \rightarrow 0} \frac{\gamma}{B} . \quad (98)$$

The magnetoresistance is identically zero in this limit.

Zero-Magnetic-Field Transport Coefficient Ratios

The zero-magnetic-field limit of the transport coefficients is of special interest since these values are often used in characterizing a semiconductor. Note that the magnetoresistance is identically zero in this limit also.

Conductivity Ratio

Substituting the zero-magnetic-field limit of the parametric integrals from (70), (71), and (72) into (64) gives for the zero-magnetic-field limit of the conductivity

$$\sigma_0 = C \left(\frac{N+3}{2} \right)! / 3\alpha - (N+2)! / 8\alpha^2 + N3(\alpha, 0, N) . \quad (99)$$

Dividing by the bulk, zero-magnetic-field limit from (79) gives the unitless conductivity ratio

$$\frac{\sigma_0}{\sigma_{b,0}} = 1 - \frac{3(N+2)!}{8\alpha \left(\frac{N+3}{2}\right)!} + \frac{3\alpha}{\left(\frac{N+3}{2}\right)!} N3(\alpha, 0, N). \quad (100)$$

The dependence on the power index and the thickness ratio of the zero-magnetic-field limit of the conductivity ratio is shown in Figure 2. This graph shows a dependence of the conductivity ratio on film thickness which is characteristic of the size effect. As the thickness of the film becomes comparable to the bulk mean free path, the conductivity of the carriers is reduced by surface scattering. When the thickness is small compared to the bulk mean free path, surface scattering is dominant and the conductivity is drastically reduced in comparison to its bulk value. There is only a slight dependence on the power index. However, even this slight difference can be used to determine the dominant bulk scattering mechanism, as will be shown in Chapter V.

Hall Coefficient Ratio

When the zero-magnetic-field limits of the parametric integrals given in (70), (71), and (72) are substituted into (65) one has for the zero-magnetic-field limit of the Hall coefficient

Figure 2. The zero-magnetic-field limit of the conductivity ratio versus the thickness ratio for four values of the power index.

$$R_{H,0} = \frac{\lim_{B \rightarrow 0} \left[\frac{2\beta}{3\alpha^2 B} \left(\frac{2N+3}{2} \right)! - \frac{\beta}{4\alpha^3 B} \left(\frac{3N+4}{2} \right)! - \frac{IN3(\alpha, \beta, N)}{B} \right]}{C \left[\frac{(N+3)!}{3\alpha} - \frac{(N+2)!}{8\alpha^2} + N3(\alpha, \beta, N) \right]^2} \quad (101)$$

Dividing this by the bulk limit gives

$$\frac{R_{H,0}}{R_{H,b,0}} = \frac{1 - \frac{3}{8\alpha} \frac{\left(\frac{3N+4}{2} \right)!}{\left(\frac{2N+3}{2} \right)!} - \frac{3\alpha^2}{\left(\frac{2N+3}{2} \right)!} \lim_{B \rightarrow 0} \frac{IN3(\alpha, \beta, N)}{\beta}}{\left| 1 - \frac{3}{8\alpha} \frac{(N+2)!}{\left(\frac{N+3}{2} \right)!} + \frac{3\alpha}{\left(\frac{N+3}{2} \right)!} N3(\alpha, 0, N) \right|^2} \quad (102)$$

The dependence of the Hall coefficient ratio on the thickness ratio and the power index is shown in Figure 3. These curves show a characteristic increase in the Hall coefficient ratio at thicknesses which are less than the bulk mean free path. This increase is indicative of the fact that the Hall mobility is affected less by the surface scattering than the conductivity mobility. The power index has only a slight effect on the Hall coefficient ratio. The increase in the Hall coefficient ratio is greater for the higher power index.

Hall Mobility Ratio

Using the zero-magnetic-field limits of the parametric integrals from (70), (71), and (72), the Hall mobility ratio is given by

Figure 3. The zero-magnetic-field limit of the Hall coefficient ratio versus the thickness ratio for four values of the power index.

$$\mu_{H,0} = \frac{\lim_{B \rightarrow 0} \left| \frac{2\beta}{3\alpha^2 B} \left(\frac{2N+3}{2} \right)! - \frac{\beta}{4\alpha^3 B} \left(\frac{3N+4}{2} \right)! - \frac{IN3(\alpha, \beta, N)}{B} \right|}{\left| \left(\frac{N+3}{2} \right)! / 3\alpha - \frac{(N+2)!}{8\alpha^2} + N3(\alpha, 0, N) \right|} \quad (103)$$

Dividing this by the bulk limit gives for the unitless Hall mobility ratio

$$\frac{\mu_{H,0}}{\mu_{H,b,0}} = \frac{1 - \frac{3}{8\alpha} \frac{\left(\frac{3N+4}{2} \right)!}{\left(\frac{2N+3}{2} \right)!} - \frac{3\alpha^2}{2 \left(\frac{2N+3}{2} \right)!} \lim_{B \rightarrow 0} \frac{IN3(\alpha, \beta, N)}{\beta}}{\left| 1 - \frac{3(N+2)!}{8\alpha^2 \left(\frac{N+3}{2} \right)!} + \frac{3\alpha N3(\alpha, 0, N)}{\left(\frac{N+3}{2} \right)!} \right|} \quad (104)$$

The dependence on the thickness ratio and the power index of the zero-magnetic-field limit of the Hall mobility ratio is shown in Figure 4. This graph shows a decrease in mobility with decreasing thickness in analogy to the size effect on the conductivity ratio. However, the effect on the Hall mobility is not as pronounced as it was on the conductivity. This decreased effect is indicative of the decreased influence of the surface on the Hall mobility. The influence of the power index is again slight.

Low Magnetic Field Transport Coefficients Ratios

The general applicability of this theory extends only into the low magnetic field regime of carrier transport. This limitation is inherent in the assumptions used to develop the linearized form of the Boltzmann equation.

Figure 4. The zero-magnetic-field limit of the Hall mobility ratio versus the thickness ratio for four values of the power index.

Conductivity Ratio

The general equation for the conductivity given in (64) can be expressed as a unitless ratio by dividing by the bulk, zero-magnetic-field limit of the conductivity given in (96). This results in

$$\frac{\sigma}{\sigma_{b,0}} = \frac{3\alpha}{2\left(\frac{N+3}{2}\right)!} \left(\text{Re} + \frac{\text{Im}^2}{\text{Re}} \right) \quad (105)$$

where Re and Im are defined in terms of the parametric integrals in (68).

The dependence of the conductivity ratio on the thickness ratio, the magnetic field parameter, and the power index is shown in Figure 5. These curves show a damped oscillation with the magnetic field parameter. This oscillation is produced by the interference of the surface scattering with the trochoidal path which the carriers would follow in a bulk sample with the same applied electric and magnetic fields. The effect of the thickness ratio on the conductivity ratio at low magnetic fields is identical to the effect at the zero-magnetic-field limit, i.e. the conductivity decreases with decreasing thickness ratio. This size effect is due to the same cause, i.e. as the thickness becomes comparable to the carrier mean free path, the carrier conductivity is reduced due to surface scattering of the carriers. There is

Figure 5a. The conductivity ratio versus the magnetic field parameter for several values of the thickness ratio with the power index = -1.

Figure 5b. The conductivity ratio versus the magnetic field parameter for several values of the thickness ratio with the power index = 0.

Figure 5c. The conductivity ratio versus the magnetic field parameter for several values of the thickness ratio with the power index = 1.

Figure 5d. The conductivity ratio versus the magnetic field parameter for several values of the thickness ratio with the power index = 3.

no dramatic change in the conductivity ratio with power index. However, for power index 3. the reduction in conductivity does persist to larger values of the thickness ratio.

Hall Coefficient Ratio

The general equation for the Hall coefficient given in (65) can be expressed as a unitless ratio by dividing by the bulk, zero-magnetic-field limit of the Hall coefficient given in (97). This gives

$$\frac{R}{R_{b,0}} = - \frac{\left| \left(\frac{N+3}{2} \right)! \right|^2}{2 \left(\frac{2N+3}{2} \right)!} \frac{\text{Im}}{B(\text{Re}^2 + \text{Im}^2)} \quad (106)$$

where Re and Im are defined in terms of the parametric integrals in (68).

The dependence of the Hall coefficient ratio on the thickness ratio, the magnetic field parameter, and the power index is shown in Figure 6. These curves show a simple dependence of the Hall coefficient on the magnetic field parameter. This dependence is a decrease in the Hall coefficient ratio to an asymptotic limit of one. The principal effect of the thickness ratio is an increase in the zero field limit of the Hall coefficient ratio with decreasing thickness ratio. The power index has little effect on the Hall coefficient ratio except at large thickness ratios, where another type of Hall coefficient appears. This Hall

Figure 6a. The Hall coefficient ratio versus the magnetic field parameter for several values of the thickness ratio with the power index = -1.

Figure 6b. The Hall coefficient ratio versus the magnetic field parameter for several values of the thickness ratio with the power index = 0.

Figure 6c. The Hall coefficient ratio versus the magnetic field parameter for several values of the thickness ratio with the power index = 1.

Figure 6d. The Hall coefficient ratio versus the magnetic field parameter for several values of the thickness ratio with the power index = 3.

coefficient persists to higher values of the magnetic field parameter and is most evident for the power index 3.

The first type of Hall coefficient is understood in terms of a simple physical model. The increase in the zero limit of the Hall coefficient ratio with decreasing thickness ratio was covered in the discussion of the zero-magnetic-field limit of the Hall coefficient ratio. The decrease in the Hall coefficient ratio to a limit of one is easily understood. As the magnetic field increases, the carrier path becomes a tight helix and the interference of the surface scattering decreases. For high enough field, the helical path becomes so tight that the effect of surface scattering is negligible. Thus the Hall coefficient is identical to the bulk value.

The second type of Hall coefficient is produced by "surface" and "bulk" carriers. The "surface" carriers are those carriers which are within a mean free path of the surface. The "bulk" carriers are unaffected by the surface, but the motion of the "surface" carriers is dominated by surface scattering. Thus, the deviation of the Hall coefficient from the bulk value is due to the presence of the "surface" carriers. The Hall coefficient ratio reaches a limit with decreasing magnetic field parameter, this limit is a result of only a fraction of the carriers being affected by the surface.

Hall Mobility Ratio

The general equation for the Hall mobility given in (66) can be expressed as a unitless ratio by dividing by the bulk, zero-magnetic-field limit of the Hall mobility given in (98). This gives

$$\frac{\mu_H}{\mu_{H,b,0}} = - \frac{3 \left(\frac{N+3}{2} \right)!}{4\alpha B \left(\frac{2N+3}{2} \right)!} \frac{\text{Im}}{\text{Re}} \quad (107)$$

where Re and Im are defined in terms of the parametric integrals in (68).

The dependence of the Hall mobility ratio on the thickness ratio, the magnetic field parameter, and the power index are shown in Figure 7. The dominant feature of these curves is a damped oscillation with the magnetic field parameter. This oscillation is produced by the same mechanism that caused the oscillation observed in the conductivity ratio. These oscillations damp out at high magnetic fields. The Hall mobility ratio also exhibits a typical size effect dependency on the thickness ratio. As the thickness decreases, the mobility decreases due to increased surface scattering. There is no dramatic change in the Hall mobility ratio with power index, however the Hall mobility ratio does tend to decrease with increasing power index.

Figure 7a. The Hall mobility ratio versus the magnetic field parameter for several values of the thickness ratio with the power index = -1.

Figure 7b. The Hall mobility ratio versus the magnetic field parameter for several values of the thickness ratio with the power index = 0.

Figure 7c. The Hall mobility ratio versus the magnetic field parameter for several values of the thickness ratio with the power index = 1.

Figure 7d. The Hall mobility ratio versus the magnetic field parameter for several values of the thickness ratio with the power index = 3.

Magnetoresistance

The dependence of the magnetoresistance given in (67) on the thickness ratio, the magnetic field parameter, and the power index are shown in Figure 8. For thin films ($\alpha < 1$) the graphs show a damped oscillation with the magnetic field parameter which is independent of power index. This oscillation damps out at high values of the magnetic field parameter. The amplitude of this oscillation and the level at which the magnetoresistance settles increases with decreasing value of the thickness ratio. This oscillation is produced in analogy to the oscillations of the conductivity and the Hall mobility from the interference of the surface scattering with the trochoidal path of the carriers produced by the presence of the applied fields. The increase of the magnetoresistance with decreasing thickness is due to the increasing domination of carrier transport by surface scattering.

For larger values of the thickness ratio ($\alpha \gg 1$), the oscillation in magnetoresistance disappears. Instead, the magnetoresistance monotonically increases to a limiting value. This type of magnetoresistance is dependent on the power index. In particular, this type of magnetoresistance is most pronounced for index 3. This type magnetoresistance is explained by the presence of the "surface" and "bulk" carriers which produced the second type of Hall coefficient.

Figure 8a. The magnetoresistance ratio versus the magnetic field parameter for several values of the thickness ratio with the power index = -1.

Figure 8b. The magnetoresistance ratio versus the magnetic field parameter for several values of the thickness ratio with the power index = 0.

Figure 8c. The magnetoresistance ratio versus the magnetic field parameter for several values of the thickness ratio with the power index = 1.

Figure 8d. The magnetoresistance ratio versus the magnetic field parameter for several values of the thickness ratio with the power index = 3.

CHAPTER V

CONCLUSIONS

Comparison with Experimental Data

A qualitative comparison between the present theory and experimental data does not reveal any drastic discrepancies. In fact the present theory provides a basis for the two-layer theory which has been used extensively to interpret experimental results. The deviation from equilibrium given in (34) is composed of two parts. The first term is identical to the deviation from equilibrium found for a carrier in an unbounded semiconductor. The second term is dependent on position relative to the surface and is negligible if the following inequality is satisfied

$$\left| \frac{z \pm d/2}{V_z \tau} \right| \gg 1, \quad (108)$$

This implies that in specimens which have a thickness greater than the mean free path, the carriers exhibit bulk characteristics for large distances from the surface. When the carriers are close to the surface, the distribution function is similar to that for a carrier in a thin film. Thus, the slab could

be approximated by two layers: a thin "surface" layer and a thick "bulk" layer. This is exactly the approximation used in the two-layer theory which has been used to interpret much of the experimental results.

A qualitative demonstration of the improvement in the theoretical interpretation of data can be give for the experimental data due to Wieder³⁷ and Teede³⁸ on the thickness dependence of the room temperature conductivity mobility of InSb films. This data is shown in Figure 9. Theoretical predictions are graphed for five different treatments:

- (1) Fuchs-Sondheimer³⁹
- (2) Many⁴⁰
- (3) two-layer theory⁴¹
- (4) present theory-acoustic phonon scattering
- (5) present theory-optical phonon scattering.

As can be seen only the two-layer theory and the optical phonon scattering give an acceptable fit to the experimental data. However, the two-layer theory assumes much about the properties of the "surface" layer in order to obtain a good fit. The present theory uses documented values for the properties of InSb. In both theories the bulk mobility is assumed to be $7 \times 10^4 \frac{\text{cm}^2}{\text{Volt-sec}}$, and the electron density is assumed to be the same in both the bulk and film. Other constants for InSb were obtained from the book on carrier transport by Nag.⁴²

Figure 9. The experimental data due to Wieder and Teede with five theoretical fits to the data; FS(1), Many(2), two-layer(3), acoustic(4), and optical phonon(5).

Limitations of the Theory

There are several limitations to the theory which result from the simplifying assumptions detailed in Chapter II. The most serious limitation is that imposed by the assumption that the semiconductor is flat-banded. This limitation could be removed by solving Poisson's equation for the position dependence of the carrier density. This dependence of the carrier density on position would affect the average of the current densities obtained in (41) and (42). The evaluation of the transport coefficients for a semiconductor with band-bending would be more difficult, but could be accomplished by numerical techniques.

Another simplification which may not be realistic is the assumption of totally diffuse scattering from the surface. There are several ways the theory could be extended to allow for deviation from diffuse scattering. The simplest approach is to introduce a parameter which is the fraction of carriers which undergo diffuse scattering at the surface. If this simple approach fails, a scattering function can be introduced to include the effect of the angle of incidence on the scattering surface. The evaluation of the transport coefficient is complicated by the introduction of this scattering function, but in principal could be accomplished by numerical techniques.

Other limitations can also be removed with additional improvements in the theory. The limitation to spherical energy surfaces can easily be removed by introducing alternate functional dependencies of the energy on the carrier momentum, e.g. elliptic or parabolic. Of course, degenerate semiconductors can be treated by introducing Fermi-Dirac equilibrium statistics and the appropriate transport equation. Thus many of the limitations could be lifted with additional theoretical effort.

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APPENDIX A

COMPUTER PROGRAMS

Several computer programs were developed to perform the numerical evaluation of the parametric integrals, calculate the values of the transport coefficient ratios, and graphically display the dependence of the transport coefficient ratios on the thickness ratio, the magnetic field parameter, and the relaxation time power index.

Evaluation of Parametric Integrals and Transport Coefficients

Zero-Magnetic-Field Limit

In the zero-magnetic-field limit the first two parametric integrals can be integrated to give a functional dependence on the thickness ratio and power index as given in (70) and (71). However the third parametric integral must be evaluated numerically. The programming to perform this quadrature was developed in BASIC and executed on a minicomputer. Sixteen point Gaussian-Laguerre quadrature was used to perform the numerical evaluation of the integral given in (74). For small values of the thickness ratio the expansion given in (80)

is used to evaluate this integral. The values of the transport coefficient ratios were then calculated from (101), (103), and (105). The complete listing of this program is given on pages 76 to 80.

Low-Magnetic-Field Limit

For low magnetic fields the parametric integrals are more complex to evaluate. In general all three parametric integrals must be evaluated numerically and the third parametric integral is a double integral which further complicates its evaluation. The programming to perform these quadratures was developed in FORTRAN IV and executed on a minicomputer. Sixteen point Gaussian-Laguerre quadrature was used to evaluate the first and second parametric integrals. One level of the integration of the third parametric integral is performed using a combination of sixteen point Gaussian-Laguerre quadrature, an asymptotic expansion, and a small value expansion. The second level of integration of the third parametric integral was performed using trapezoidal quadrature. The values of the transport ratios are calculated from (106), (107), (108), and (109). The complete listing of the main program is given on pages 81 to 85. The complete listing of the subroutine to perform the sixteen point Gaussian-Laguerre quadrature is given on pages 86 to 87.

Graphics Programming

Zero-Magnetic-Field Limit

A graphics program was developed in BASIC to display the dependence of the zero-magnetic-field limit of the transport coefficient ratios on the thickness ratio and the power index. The complete listing of this program is given on pages 88 to 91. Figures 2 to 4 were produced using this program.

Low Magnetic Field

A graphics program was developed in BASIC to display the dependence of the low-magnetic-field values of the transport coefficient ratios on the magnetic field parameter, the thickness ratio, and the power index. The complete listing of this program is given on pages 92 to 95. Figures 5 to 8 were produced using this program.

```

90 REM ZERO-MAGNETIC-FIELD TRANSPORT COEFFICIENT RATIOS
100 INIT
110 CALL "RATE",2400,0,2
120 F$=CHR(12)
130 F$=" "&F$
140 S$=CHR(13)
150 S$=" "&S$
160 DATA -1,11,0,12,1,13,3,14
170 REM *****
180 REM DRIVER FOR GAUSSIAN-LAGUERRE QUADRATURE
190 PAGE
200 N=1
210 I6=1
220 A9=0
230 DIM I(3)
240 F=1
250 READ N
260 READ F2
270 FIND F2
280 WRITE N
290 PRINT @40,12:F$
300 FOR I5=1 TO 900
310 NEXT I5
320 FOR I6=1 TO 5
330 PRINT @40,12:S$
340 FOR I5=1 TO 100
350 NEXT I5
360 NEXT I6
370 PRINT @40,12:"          THE POWER INDEX IS ";N;". "
380 FOR I5=1 TO 300
390 NEXT I5
400 PRINT @40,12:"          THE MAGNETIC FIELD PARAM";
410 PRINT @40,12:"ETER IS ZERO."
420 FOR I5=1 TO 300
430 NEXT I5
440 PRINT @40,12:S$
450 FOR I5=1 TO 100
460 NEXT I5
470 PRINT @40,12:"      "," THICKNESS"
480 FOR I5=1 TO 200
490 NEXT I5
500 PRINT @40,12:"      "," RATIO","      RN3","IN3/BETA"
510 FOR I5=1 TO 300
520 NEXT I5
530 PRINT @40,12:S$
540 FOR I7=1 TO 201
550 A=10^(-3+(I7-1)*0.025)
560 GOSUB 1250
570 I8=1
580 PRINT @40,12: USING 600:A,I(1)/A/A,-2*I(2)/A^3-I(3)/A/A
590 WRITE A,I

```

```

600 IMAGE 19T,3( 3E,6X)
610 F=2
620 IF I7=46 THEN 670
630 IF I7=94 THEN 670
640 IF I7=142 THEN 670
650 IF I7=190 THEN 670
660 GO TO 840
670 FOR I5=1 TO 300
680 NEXT I5
690 PRINT @40,12:F$
700 FOR I5=1 TO 900
710 NEXT I5
720 FOR I6=1 TO 7
730 PRINT @40,12:S$
740 FOR I5=1 TO 100
750 NEXT I5
760 NEXT I6
770 PRINT @40,12:"      ", " THICKNESS"
780 FOR I5=1 TO 200
790 NEXT I5
800 PRINT @40,12:"      ", " RATIO", "      RN3", "ING/BETA"
810 FOR I5=1 TO 300
820 NEXT I5
830 PRINT @40,12:S$
840 NEXT I7
850 IF NC>3 THEN 250
860 GO TO 2000
870 END
880 REM END OF DRIVER
890 REM *****
900 REM
910 REM
920 REM *****
930 REM  FUNCTION SUBROUTINE
940 REM EACH FUNCTION MUST BE ENTERED AS AN INDIVIDUAL SUBROUTINE
950 IF N=-1 AND I8=2 THEN 1040
960 Y=0
970 Y7=0
980 GOSUB 1720
990 I8=2
1000 IF A/X>700 THEN 1030
1010 Y=EXP(-A/X)*(1/4-A/12*5/X-A*A/24/X^2+A^3/24/X^3)
1020 Y7=EXP(-A/X)*(2/3+A/X/6-A*A/X/X/6)+(A^3/X^3/6-A/X)*E1
1030 Y=Y+(A*A/2/X^2-A^4/24/X^4)*E1
1040 Y1=Y*(P2)^(N+2)/2
1050 Y2=Y*(P2)^(N*3/2+2)/2
1060 Y3=Y7*(P2)^(N+3/2)/2
1070 RETURN
1080 REM  INTEGRATION SUBROUTINE
1090 REM *****
1100 REM PERFORMS INTEGRATION OF A GIVEN FUNCTION BY 16-POINT
1110 REM GAUSSIAN-LAGUERRE QUADRATURE
1120 REM

```

```

1130 REM PURPOSE: TO COMPUTE INTEGRAL EXP(-X)*FUNC(X) (0 TO INFINITY)
1140 REM
1150 REM PARAMETERS:
1160 REM   Y - FUNCTION TO BE INTEGRATED (INPUT)
1170 REM   I - THE RESULTING INTEGRAL VALUE (OUTPUT)
1180 REM
1190 REM REF: SYSTEM/360 SCIENTIFIC SUBR. PACKAGE, VERSION III
1200 REM       SHAO/CHEN/FRANK, "TABLES OF ZEROS AND GAUSSIAN WEIGHTS
1210 REM       OF CERTAIN ASSOCIATED LAGUERRE POLYNOMIALS AND THE
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1240 REM
1250 IF F<0 THEN 1630
1260 P1=16
1270 DELETE P,Q
1280 DIM P(P1),Q(P1)
1290 REM   P(P1) ARE THE ZEROS OF THE ASSOCIATED LAGUERRE POLYNOMIAL
1300 P(1)=51.7011603395
1310 P(2)=41.9404526477
1320 P(3)=34.5833987023
1330 P(4)=28.5787297429
1340 P(5)=23.515905694
1350 P(6)=19.1801568568
1360 P(7)=15.4415273688
1370 P(8)=12.2142233689
1380 P(9)=9.43831433639
1390 P(10)=7.07033853505
1400 P(11)=5.07801861455
1410 P(12)=3.43708663389
1420 P(13)=2.1292836451
1430 P(14)=1.14105777483
1440 P(15)=0.462696328915
1450 P(16)=0.0876494104789
1460 REM   Q(P1) ARE THE GAUSSIAN WEIGHTS OF THE LAGUERRE POLYNOMIAL
1470 Q(1)=4.16146237E-22
1480 Q(2)=5.0504737E-18
1490 Q(3)=6.297967003E-15
1500 Q(4)=2.127079033E-12
1510 Q(5)=2.862350243E-10
1520 Q(6)=1.881024841E-8
1530 Q(7)=6.828319331E-7
1540 Q(8)=1.484458667E-5
1550 Q(9)=2.042719153E-4
1560 Q(10)=0.00184907094353
1570 Q(11)=0.0112999000803
1580 Q(12)=0.0473289286941
1590 Q(13)=0.136296934296
1600 Q(14)=0.265795777644
1610 Q(15)=0.331057654951
1620 Q(16)=0.206151714958
1630 I=0
1640 FOR P2=1 TO P1
1650 X=P(P2)^( (N+1)/2)

```

```

1660 GOSUB 910
1670 I(1)=I(1)+Q(P2)*Y1
1680 I(2)=I(2)+Q(P2)*Y2
1690 I(3)=I(3)+Q(P2)*Y3
1700 NEXT P2
1710 RETURN
1720 REM SUBROUTINE TO CALCULATE VALUE OF E1
1730 REM USING RATIONAL APPROXIMATIONS FROM NBS HANDBOOK OF
1740 REM MATHEMATICAL FUNCTIONS ED. ABRAMOWITZ&STEGUN, P. 231
1750 Z2=A/X
1760 IF F>1 THEN 1910
1770 A0=-0.57721566
1780 A1=0.99999193
1790 A2=-0.24991055
1800 A3=0.05519968
1810 A4=-0.00976004
1820 A5=0.00107857
1830 B1=8.5733287401
1840 B2=18.059016973
1850 B3=8.6347608925
1860 B4=0.2677737343
1870 C1=9.5733223454
1880 C2=25.6329561486
1890 C3=21.0996530827
1900 C4=3.9584969228
1910 IF Z2<=1 THEN 1980
1920 IF Z2>700 THEN 1960
1930 E1=(Z2^4+B1*Z2^3+B2*Z2^2+B3*Z2+B4)/(Z2^4+C1*Z2^3+C2*Z2^2+C3*Z2+C4)
1940 E1=E1/Z2*EXP(-Z2)
1950 RETURN
1960 E1=0
1970 RETURN
1980 E1=A0+A1*Z2+A2*Z2^2+A3*Z2^3+A4*Z2^4+A5*Z2^5-LOG(Z2)
1990 RETURN
2000 REM SUBROUTINE TO CALCULATE CONDUCTIVITY AND HALL COEFFICIENT.
2010 DIM S(200),R(200),E(200),A8(200)
2020 F$=CHR(12)
2030 F$=" "&F$
2040 DATA -1,11,1,1,1,0.88622693,0.88622693,0,12,1.5045055,0.755225277
2050 DAT 0.755225277,1.3293404,2,1,13,3,0.5,0.5,3.3233509,11.631728,3,14
2060 DATA 20,0.166666666667,0.166666666667,52.342778,1871.2543
2070 READ N,F,A1,A2,A3,A4,A5
2080 FIND F
2090 READ @33:N1
2100 IF N1=N THEN 2120
2110 STOP
2120 PRINT @40,12:F$
2130 GOSUB 2420
2140 A$="ALPHA"
2150 B$="CONDUCTIVITY (B=0)"
2160 C$="HALL CONDUCTIVITY (B=0)"
2170 D$="HALL FIELD"
2180 PRINT @40,12:A$,E$,C$,D$

```



```
2190 GOSUB 2450
2200 FOR I7=1 TO 200
2210 READ @33: A, I1, J1, K1
2220 A8(I7)=A
2230 S(I7)=1-3/8/A*A1+3/A*A2*I1
2240 R(I7)=(1-3/4/A*A5/A4+6/A/A4*J1+3/A4*K1)/S(I7)^2
2250 PRINT @40, 12: A, S(I7), R(I7), R(I7)*S(I7)
2260 GOSUB 2450
2270 IF I7<60 THEN 2290
2280 GO TO 2320
2290 IF I7<120 THEN 2310
2300 GO TO 2320
2310 IF I7<180 THEN 2340
2320 PRINT @40, 12: F$
2330 GOSUB 2420
2340 NEXT I7
2350 FIND F+4
2360 WRITE N1
2370 FOR I7=1 TO 200
2380 WRITE A8(I7), S(I7), R(I7)
2390 NEXT I7
2400 GO TO 2070
2410 END
2420 FOR J=1 TO 900
2430 NEXT J
2440 RETURN
2450 FOR J=1 TO 225
2460 NEXT J
2470 RETURN
2480 END
```

```

0001  FTN. B, L
0002      PROGRAM ETCF2
0003      DIMENSION AI(6), IFILE(3), BUF(2), DBUF(60)
0004      DOUBLE PRECISION A5, B5, R1, A11, AI, R2, A12, R3, A13, R4, A14, R5, A15
0005      1, R6, A16, REAL, AIMAG, A9, B9, D5, D9, X5, S5
0006      2, S0
0007      COMMON A5, B5, IN9, IND, R1, A11, AI
0008      1, A9, B9
0009      LPRT=7
0010      ITTYI=1
0011      ITTYO=6
0012      ITEK=8
0013      IND=1
0014      ICNWD=102B
0015      IFORM=20014B
0016  10  CONTINUE
0017      WRITE(ITTYO, 2000)
0018  20  WRITE(ITTYO, 2100)
0019      READ(ITTYI, *) ISEL
0020      GO TO (100, 200, 300, 400, 500, 600, 700, 800, 900) ISEL
0021  C
0022  100 WRITE(ITTYO, 2010)
0023      READ(ITTYI, *) IN9
0024      WRITE(ITTYO, 2020)
0025      READ(ITTYI, *) ICYL
0026      WRITE(ITTYO, 2025)
0027      READ(ITTYI, *) IST
0028      WRITE(ITTYO, 2030)
0029      READ(ITTYI, *) S5
0030      WRITE(ITTYO, 2040)
0031      READ(ITTYI, *) D5
0032      WRITE(ITTYO, 2050)
0033      READ(ITTYI, *) IN5
0034      GO TO 20
0035  C
0036  200 D9=B9/200.
0037      IDATA=1
0038      IRCDE=15
0039      IPASS=1
0040      WRITE(ITTYO, 2080)
0041      READ(ITTYI, *) A9
0042      WRITE(ITTYO, 2060)
0043      READ(ITTYI, 2070) IFILE
0044      IFILE(3)=IAND(IFILE(3), 177400B)+40B
0045      BUF(1)=SNGL(A9)
0046      BUF(2)=FLOAT(IN9)
0047      CALL EXEC(IRCDE, ICNWD, BUF, 4, IFILE, 0)
0048      ILM=ICYL*100+1

```

```

0049      DO 290 J=1, ILM
0050      B9=DBLE(10. ** (FLOAT(J-1)*.01+FLOAT(IST)))
0051      AI(5)=0.
0052      AI(6)=0.
0053      DO 250 J5=1, IN5
0054      X5=S5+DBLE(FLOAT(J5-1))*D5
0055      A5=A9/X5**(IN9+1)
0056      B5=B9/X5
0057      IF (A5-.75.) 220, 220, 250
0058 220  CONTINUE
0059      CALL INT1
0060      IND=3
0061      R2=.25-.5./12.*A5-(A5*A5-B5*B5)/24.+(A5**3-3.*A5*B5*B5)/24.
0062      A12=-.5.*B5/12.-A5*B5/12.-(B5**3-3.*A5*A5*B5)/24.
0063      R3=(A5*A5-B5*B5)/2.-(A5**4-6.*A5*A5*B5*B5+B5**4)/24.
0064      A13=A5*B5-(A5**3*B5-A5*B5**3)/6.
0065      R4=R2+R3*R1-A13*A11
0066      A14=A12+A11*R3+A13*R1
0067      R5=R4*(A5*A5-B5*B5)+2.*A14*A5*B5
0068      A15=A14*(A5*A5-B5*B5)-R4*2.*A5*B5
0069      R6=R5*DCOS(B5)+A15*DSIN(B5)
0070      A16=A15*DCOS(B5)-R5*DSIN(B5)
0071      AI(5)=AI(5)+R6*D5*X5**3*DEXP(-X5*X5-A5)/(A5*A5+B5*B5)**2
0072      AI(6)=AI(6)+A16*D5*X5**3*DEXP(-X5*X5-A5)/(A5*A5+B5*B5)**2
0073 250  CONTINUE
0074      IND=2
0075      CALL INT1
0076      IND=3
0077      DBUF(10*IDATA-9)=SNGL(AI(1))
0078      DBUF(10*IDATA-8)=SNGL(AI(2))
0079      DBUF(10*IDATA-7)=SNGL(AI(3))
0080      DBUF(10*IDATA-6)=SNGL(AI(4))
0081      DBUF(10*IDATA-5)=SNGL(AI(5))
0082      DBUF(10*IDATA-4)=SNGL(AI(6))
0083      REAL=AI(1)-3.*AI(3)/8.+3.*AI(5)/2.
0084      AIMAG=AI(2)-3.*AI(4)/8.+3.*AI(6)/2.
0085      DBUF(10*IDATA-3)=SNGL(-(AIMAG/(REAL**2+AIMAG**2)/B9)
0086      DBUF(10*IDATA-2)=SNGL(-(AIMAG/REAL)
0087      IF (B5-5.E-3) 260, 270, 270
0088 260  S0=AI(5)*3./2.+AI(1)-AI(3)*3./8.
0089 270  DBUF(10*IDATA-1)=SNGL(1.-(REAL**2+AIMAG**2)/REAL/S0)
0090      DBUF(10*IDATA)=SNGL(REAL+AIMAG**2/REAL)
0091      IDATA=IDATA+1
0092      IF (IDATA-7) 290, 280, 290
0093 280  IDATA=1
0094      CALL EXEC(IRCDE, ICNWD, DBUF, 120, IFILE, IPASS)
0095      IPASS=IPASS+1
0096 290  CONTINUE

```

```

0097      IF(ILM-IPASS*6) 295,20,295
0098 295  CALL EXEC(IRCDE,ICNWD,DBUF,120,IFILE,IPASS)
0099      GO TO 20
0100 C
0101 300  CONTINUE
0102      GO TO 20
0103 C
0104 400  WRITE(LPRT,2008) IFORM
0105      JND=58
0106      IRCDE=14
0107      WRITE(ITYO,2060)
0108      READ(ITYI,2070) IFILE
0109      CALL EXEC(IRCDE,ICNWD,BUF,4,IFILE,0)
0110      A9=DBLE(BUF(1))
0111      IN9=IFIX(BUF(2))
0112      WRITE(LPRT,2004) A9,IN9
0113      ILM2=IFIX(FLOAT(ILM)/6. )+1
0114      DO 490 IPASS=1,ILM2
0115      CALL EXEC(IRCDE,ICNWD,DBUF,120,IFILE,IPASS)
0116      DO 490 J=1,6
0117      B9=DBLE(10.**(FLOAT(IPASS*6-6+J)))
0118      R1=DBLE(DBUF(10*J-9))
0119      A11=DBLE(DBUF(10*J-8))
0120      R2=DBLE(DBUF(10*J-7))
0121      A12=DBLE(DBUF(10*J-6))
0122      R3=DBLE(DBUF(10*J-5))
0123      A13=DBLE(DBUF(10*J-4))
0124      WRITE(LPRT,2002)B9,R1,A11,R2,A12,R3,A13
0125      JND=JND-1
0126      IF(JND) 490,430,490
0127 430  JND=58
0128      WRITE(LPRT,2008) IFORM
0129      WRITE(LPRT,2004) A9,IN9
0130 490  CONTINUE
0131      GO TO 20
0132 C
0133 500  WRITE(LPRT,2008) IFORM
0134      IRCDE=14
0135      WRITE(ITYO,2060)
0136      READ(ITYI,2070) IFILE
0137      CALL EXEC(IRCDE,ICNWD,BUF,4,IFILE,0)
0138      A9=DBLE(BUF(1))
0139      IN9=IFIX(BUF(2))
0140      WRITE(LPRT,2005) A9,IN9
0141      JND=58
0142      ILM2=IFIX(FLOAT(ILM)/6. )+1
0143      DO 510 IPASS=1,ILM2
0144      CALL EXEC(IRCDE,ICNWD,DBUF,120,IFILE,IPASS)

```

```

0145      DO 510 J=1,6
0146      IF(J+ILM2*6-ILM) 530,530,540
0147 530 CONTINUE
0148      B9=DBLE(10. *(FLOAT(IPASS*6-6+J)))
0149      SIGMA=DBUF(10*J)
0150      HALL=DBUF(10*J-3)
0151      AMRES=DBUF(10*J-1)
0152      MOB=DBUF(10*J-2)
0153      WRITE(LPRT,2009) B9,SIGMA,HALL,AMRES,MOB
0154      JND=JND-1
0155      IF(JND) 510,505,510
0156 505 JND=58
0157      WRITE(LPRT,2008) IFORM
0158      WRITE(LPRT,2005) A9,IN9
0159 510 CONTINUE
0160 540 CONTINUE
0161      GO TO 20
0162 C
0163 600 CONTINUE
0164      GO TO 20
0165 C
0166 700 CONTINUE
0167      GO TO 20
0168 C
0169 800 CONTINUE
0170      GO TO 20
0171 C
0172 900 CONTINUE
0173      IRCDE=6
0174      CALL EXEC(IRCDE)
0175 C
0176 2000 FORMAT(5X,"SELECT FROM THE FOLLOWING MENU: "
0177      1/10X,"1---PARAMETER INPUT"
0178      2/10X,"2---NUMERICAL CALCULATIONS"
0179      3/10X,"3---"
0180      4/10X,"4---PRINT THE PARAMETRIC INTEGRALS"
0181      5/10X,"5---PRINT THE TRANSPORT COEFFICIENTS"
0182      9/10X,"9---TERMINATE THE PROGRAM")
0183 2001 FORMAT(F5.0,I3)
0184 2002 FORMAT(7E10,4)
0185 2004 FORMAT("ALPHA IS ",F5.3,". SCATTERING INDEX IS ",I3,/3X,"BETA",
0186      16X,"RN1",7X,"IN1",7X,"RN2",7X,"IN2",7X,"RN3",7X,"IN3")
0187 2005 FORMAT("ALPHA IS ",F5.3,". THE SCATTERING INDEX IS ",I3,
0188      1/3X,"BETA",6X,"COND",6X,"HALL",6X,"MRES",6X,"MOB")
0189 2006 FORMAT(5E10,4)
0190 2007 FORMAT(6E10,4)
0191 2008 FORMAT(1A2)
0192 2009 FORMAT(5E10,4)

```

```
0193 2010 FORMAT("WHAT IS THE POWER INDEX?")
0194 2020 FORMAT("HOW MANY POWER OF TEN CYCLES DO YOU WANT FOR BETA?")
0195 2025 FORMAT("WHAT IS STARTING CYCLE FOR BETA (INTEGRAL POWER OF TEN)?")
0196 2030 FORMAT("WHAT IS STARTING VALUE OF INTEGRAL?")
0197 2040 FORMAT("WHAT IS INTEGRAL STEP?")
0198 2050 FORMAT("HOW MANY ITERATIONS?")
0199 2060 FORMAT("WHAT IS DISC FILE NAME?")
0200 2070 FORMAT(3A2)
0201 2080 FORMAT("WHAT IS VALUE OF ALPHA?")
0202 2090 FORMAT("DO YOU WANT TO PRINT OUT THE PARAMETRIC INTEGRAL VALUES?"
0203      1 , " (NO=0, YES=1)")
0204 2100 FORMAT("READY")
0205      END
```

```

0001  FTN, E, L
0002      SUBROUTINE INT1
0003      DIMENSION P(16), Q(16), A10(2), A1(6)
0004      DOUBLE PRECISION P, Q, A10, A1, X, Y1, Y2, A11, R1, A5, B5, A9, B9, R2
0005      COMMON A5, B5, IN5, IND, R1, A11, A1, A9, B9
0006      GO TO (10, 40, 15) IND
0007  5      IF (DSQRT(A5*A5+B5*B5)-.6) 200, 10, 10
0008  10      CONTINUE
0009          P(1)=51.7011603395
0010          P(2)=41.9404526477
0011          P(3)=34.5833987023
0012          P(4)=28.5787297429
0013          P(5)=23.515905694
0014          P(6)=19.1801568568
0015          P(7)=15.4415273688
0016          P(8)=12.2142233689
0017          P(9)=9.43831433639
0018          P(10)=7.07033853505
0019          P(11)=5.07801861455
0020          P(12)=3.43708663389
0021          P(13)=2.1292836451
0022          P(14)=1.14105777483
0023          P(15)=0.462696328915
0024          P(16)=0.0876494104789
0025          Q(1)=4.16146237E-22
0026          Q(2)=5.0504737E-18
0027          Q(3)=6.297967003E-15
0028          Q(4)=2.127079033E-12
0029          Q(5)=2.862350243E-10
0030          Q(6)=1.881024841E-8
0031          Q(7)=6.828319331E-7
0032          Q(8)=1.484458687E-5
0033          Q(9)=2.042719153E-4
0034          Q(10)=0.00184907094353
0035          Q(11)=0.0112999000803
0036          Q(12)=0.0473289286941
0037          Q(13)=0.136296934296
0038          Q(14)=0.265795777644
0039          Q(15)=0.331057854951
0040          Q(16)=.206151714958
0041  15      IF (DSQRT(A5*A5+B5*B5)-.6) 200, 30, 30
0042  30      A10(1)=0.
0043          A10(2)=0.
0044          DO 100 I2=1, 16
0045              X=P(I2)
0046              Y1=(X+A5)/((X+A5)**2+B5*B5)
0047              Y2=-B5/((X+A5)**2+B5*B5)
0048              A10(1)=A10(1)+Q(I2)*Y1

```

```

0049      AI0(2)=AI0(2)+Q(I2)*Y2
0050 100  CONTINUE
0051      R1=AI0(1)
0052      AI1=AI0(2)
0053      RETURN
0054 200  IF(DSORT(A5*A5+B5*B5)-1.E-15) 300,210,210
0055 210  R1=-0.5772156649-DLOG(A5*A5+B5*B5)/2.+A5-(A5*A5-B5*B5)/4.
0056      IF(B5)230,230,220
0057 220  AI1=-DATAN(B5/A5)+B5-A5*B5/2.
0058      GO TO 240
0059 230  AI1=0.
0060 240  R1=R1+(A5**3-3.*A5*B5*B5)/18.-(A5**4-6.*A5*A5*B5+B5*B5**4)/96.
0061      1+(A5**5-10.*A5**3*B5*B5+5.*A5*B5**4)/600.-(A5**6-15.*A5**4*B5*B5
0062      2+15.*A5*A5*B5**4-B5**6)/4320.+(A5**7-21.*A5**5*B5*B5+35.*A5**3
0063      3*B5**4-7.*A5*B5**6)/35280.-(A5**8-28.*A5**6*B5*B5+70.*A5**4*B5**4
0064      4-28.*A5*A5*B5**6+B5**8)/322560.
0065      AI1=AI1+(3.*A5*B5*B5-B5**3)/18.-(A5**3*B5-A5*B5**3)/24.
0066      1+(5.*A5**4*B5-A5*A5*B5**3*10.+B5**5)/600.-(6.*A5**5*B5-
0067      220.*A5**3*B5**3+6.*A5*B5**5)/4320.+(7.*A5**6*B5-35.*A5**4*B5**3
0068      3+21.*A5*A5*B5**5-B5**7)/35280.-(8.*A5**7*B5-56.*A5**5*B5**3
0069      4+56.*A5**3*B5**5-8.*A5*B5**7)/322560.
0070      R2=DEXP(A5)*(R1*DCOS(B5)-AI1*DSIN(B5))
0071      AI1=DEXP(A5)*(R1*DSIN(B5)+AI1*DCOS(B5))
0072      R1=R2
0073      RETURN
0074 40  AI(1)=0.
0075      AI(2)=0.
0076      AI(3)=0.
0077      AI(4)=0.
0078      DO 400 I2=1,16
0079      X=P(I2)
0080      AI(1)=AI(1)+Q(I2)*A9*DSORT(X)**(3+IN5)/B9/B9
0081      1/(A9*A9/B9/B9+X**IN5)
0082      AI(2)=AI(2)-Q(I2)*DSORT(X)**(3+2*IN5)/2./B9/(A9*A9/B9/B9
0083      1+X**IN5)
0084      AI(3)=AI(3)+Q(I2)*X**(2+IN5)/2./B9/B9/(A9*A9/B9/B9+X**IN5)**2
0085      1*(A9*A9/B9/B9-X**IN5)
0086      AI(4)=AI(4)-Q(I2)*A9/B9**3*DSORT(X)**(4+3*IN5)/(A9*A9/B9/B9
0087      1+X**IN5)**2
0088 400  CONTINUE
0089      RETURN
0090 300  AI1=0.
0091      R1=-0.5771156649
0092      RETURN
0093      END

```



```

90 REM ZERO-MAGNETIC-FIELD GRAPHICS
100 INIT
110 DEF FNX(X)=A5(I5)*X*((-LOG(X.+1-G)/4+.105696083775/2*(N9(I5)+1))
120 DATA 3,2.25675833419,1.5,0.5,0.375,0.564189583548,1.125,7.5
130 DATA -1,0,1,3
140 DEF FNY(X)=A2(I5)*X*3/4
150 DATA 1,0.752252778064,0.4,0.0634920634921
160 DATA 0.75,1.1283791671,2.625,26.8125
170 DATA 15,16,17,18
180 DATA 1,1.5045,3,20,0.076,0.101,0.122,0.141,0.158,0.174,0.189,0.203
190 DIM T(23),N(4),A5(4),A6(4),N9(4),A3(4),A2(4),A8(4)
200 READ A5,A6,N9,A2,A8
210 READ N
220 G=0.577
230 A3(1)=0.2
240 A3(2)=0.3
250 A3(3)=0.4
260 A3(4)=2.4
270 T=0
280 T(1)=200
290 T(2)=2
300 T(3)=1
310 T(4)=30
320 T(5)=80
330 T(6)=0
340 T(7)=6
350 T(8)=1
360 T(9)=1
370 T(14)=20
380 T(15)=80
390 T(16)=0
400 T(17)=4
410 T(18)=1
420 T(19)=1
430 N5=4
440 FOR I3=1 TO 3
450 T(17)=4
460 IF I3<>2 THEN 480
470 T(17)=3
480 PAGE
490 IF I3=3 THEN 520
500 I4=(I3-1)*2+1
510 GO TO 530
520 I4=1
530 VIEWPORT 0,100,0,130
540 WINDOW 0,100,0,130
550 MOVE 0,99
560 GO TO I3 OF 570,590,570
570 PRINT "          10"
580 GO TO 600
590 PRINT "          100"

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```

600 MOVE 0,72
610 PRINT "          "
620 MOVE 0,79
630 GO TO I3 OF 640,660,640
640 PRINT "          1"
650 GO TO 670
660 PRINT "          "
670 MOVE 0,67
680 PRINT "          "
690 MOVE 0,59
700 GO TO I3 OF 710,730,710
710 PRINT "          0.1"
720 GO TO 750
730 MOVE 0,72
740 PRINT "          10"
750 MOVE 0,39
760 GO TO I3 OF 770,790,770
770 PRINT "          0.01"
780 GO TO 810
790 MOVE 0,46
800 PRINT "          1"
810 MOVE 0,19
820 GO TO I3 OF 830,850,830
830 PRINT "          0.001"
840 GO TO 860
850 PRINT "          0.1"
860 MOVE 0,16
870 IMAGE 14X,1D,3D, 3X,1D,2D, 2X,3D,1D,6X,1D, 6X,2D, 5X,3D,4X,4D
880 IMAGE 12X
890 PRINT USING 870:1.0E-3,0.01,0.1,1,10,100,1000
900 VIEWPORT T(4),T(4)+T(5),T(14),T(14)+T(15)
910 WINDOW T(6),T(6)+T(7),T(16),T(16)+T(17)
920 AXIS 1,1
930 FOR I5=1 TO N5
940 FIND N(I5)
950 READ @33:N7
960 FOR U1=1 TO T(1)
970 READ @33:A,S,H
980 X1=LGT(A)+3
990 Y1=LGT(S)+3
1000 IF I3=1 THEN 1120
1010 IF I3=3 THEN 1070
1020 IF H<0 THEN 1140
1030 Y1=LGT(H)+1
1040 IF X1<=1.7 THEN 1140
1050 IF I5=1 AND X1<=2.7 THEN 1140
1060 GO TO 1120
1070 IF S*H<0 THEN 1140
1080 Y1=LGT(S*H)+3
1090 IF X1<1.6 THEN 1140
1100 IF I5<>1 THEN 1120
1110 IF X1<2.5 THEN 1140
1120 MOVE X1,Y1

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```

1130 RDRAW 0,0
1140 NEXT U1
1150 GO TO I3 OF 1160,1280,1380
1160 MOVE 0,LOG(FNX(1.0E-3))/LOG(10)+3
1170 FOR J7=1 TO 50
1180 DRAW J7*0.04,LOG(FNX(10^(J7*0.04-3)))/LOG(10)+3
1190 NEXT J7
1200 J8=4
1210 IF I5<4 THEN 1230
1220 J8=5
1230 MOVE J8,LGT(1-A6(I5)/10^(J8-3))+3
1240 FOR J7=1 TO 50
1250 DRAW J8+J7*0.04,LGT(1-A6(I5)/10^(J8-3+J7*0.04))+3
1260 NEXT J7
1270 GO TO 1440
1280 MOVE 0,LGT(FNY(1.0E-3)/FNX(1.0E-3)^2)+1
1290 FOR J7=1 TO 42
1300 DRAW J7*0.04,LGT(FNY(10^(-3+J7*0.04))/FNX(10^(-3+J7*0.04))^2)+1
1310 NEXT J7
1320 IF I5>1 THEN 1440
1330 MOVE 4,LGT(1+(2*A6(I5)-A8(I5))/10)+1
1340 FOR J7=1 TO 50
1350 DRAW 4+J7*0.04,LGT(1+(2*A6(I5)-A8(I5))/10^(4+J7*0.04))+1
1360 NEXT J7
1370 GO TO 1440
1380 MOVE 0,LGT(FNX(1.0E-3))+3+LGT(FNY(1.0E-3)/FNX(1.0E-3)^2)
1390 FOR J7=1 TO 40
1400 DRAW J7*0.04,-LGT(FNX(10^(J7*0.04-3)))+3+LGT(FNY(10^(J7*0.04-3)))
1410 NEXT J7
1420 MOVE 5,3
1430 DRAW 6,3
1440 NEXT I5
1450 HOME
1460 VIEWPORT 0,130,0,100
1470 WINDOW 0,130,0,100
1480 MOVE 0,9
1490 GO TO I3 OF 1500,1530,1560
1500 PRINT "FIGURE 2: THE ZERO-MAGNETIC-FIELD LIMIT OF THE CONDUCTIVITY";
1510 PRINT "Y RATIO"
1520 GO TO 1580
1530 PRI "FIGURE 3: THE ZERO-MAGNETIC-FIELD LIMIT OF THE HALL COEFFIC";
1540 PRINT "IENT RATIO"
1550 GO TO 1580
1560 PRI "FIGURE 4: THE ZERO-MAGNETIC-FIELD LIMIT OF THE HALL MOBILIT";
1570 PRINT "Y RATIO"
1580 PRINT "          VERSUS THE THICKNESS RATIO FOR FOUR VALUES OF TH";
1590 PRINT "E POWER INDEX. ";
1600 MOVE 0,58
1610 GO TO I3 OF 1620,1640,1640
1620 PRINT "CONDUCTIVITY"
1630 GO TO 1690
1640 PRINT "    HALL"
1650 GO TO I3-1 OF 1660,1680

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```
1660 PRINT "COEFFICIENT"  
1670 GO TO 1690  
1680 PRINT " MOBILITY"  
1690 PRINT "  RATIO"  
1700 MOVE 47,13  
1710 PRINT "THICKNESS RATIO (ALPHA)";  
1720 HOME  
1730 COPY  
1740 PAGE  
1750 NEXT I3  
1760 END
```

```

90 REM LOW-MAGNETIC-FIELD GRAPHICS
100 INIT
110 DATA 2, 1, 50450555613, 1, 0, 333333333333
120 DATA 0, 564189583548, 0, 66467019409, 0, 601802222451, 0, 343886984258
130 DATA -1, 0, 1, 3
140 DATA 1, 1, 5045, 3, 20, 0, 076, 0, 101, 0, 122, 0, 141, 0, 158, 0, 174, 0, 189, 0, 203
150 DIM T(23), N(6), A5(4), A6(4), N9(4), A3(4), A7(6, 4)
160 READ A5, A6, N9
170 A3(1)=0, 2
180 A3(2)=0, 3
190 A3(3)=0, 4
200 A3(4)=2, 4
210 A7(1, 1)=0, 00549840352323
220 A7(2, 1)=0, 0377592450543
230 A7(3, 1)=0, 209132569768
240 A7(4, 1)=0, 683856591582
250 A7(5, 1)=0, 962500068851
260 A7(6, 1)=0, 99625
270 A7(1, 2)=0, 00433342341785
280 A7(2, 2)=0, 0296549137329
290 A7(3, 2)=0, 168872733034
300 A7(4, 2)=0, 601188830132
310 A7(5, 2)=0, 943613057998
320 A7(6, 2)=0, 99435810419
330 A7(1, 3)=0, 00290736540774
340 A7(2, 3)=0, 0204610093942
350 A7(3, 3)=0, 120244860403
360 A7(4, 3)=0, 472534643745
370 A7(5, 3)=0, 890504753387
380 A7(6, 3)=0, 98875
390 A7(1, 4)=0, 00102193464409
400 A7(2, 4)=0, 00736130402947
410 A7(3, 4)=0, 0458676313751
420 A7(4, 4)=0, 215912783378
430 A7(5, 4)=0, 614495601891
440 A7(6, 4)=0, 925
450 T=0
460 T(1)=200
470 T(2)=1
480 T(3)=1
490 T(4)=30
500 T(5)=80
510 T(6)=0
520 T(7)=3
530 T(8)=1
540 T(9)=1
550 T(14)=10
560 T(15)=80
570 T(16)=0
580 T(17)=5
590 T(18)=1

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600 T(19)=1
610 N5=6
620 PRINT "INSERT DATA TAPE AND PRESS RETURNING*";
630 INPUT D$
640 FOR I3=1 TO 4
650 FOR J5=1 TO 4
660 PAGE
670 VIEWPORT 0,100,0,130
680 WINDOW 0,100,0,130
690 MOVE 0,89
700 GO TO I3 OF 710,730,710,750
710 PRINT "          1"
720 GO TO 760
730 PRINT "          2.5"
740 GO TO 760
750 PRINT "          4"
760 MOVE 0,73
770 GO TO I3 OF 780,800,780,820
780 PRINT "          0.8"
790 GO TO 830
800 PRINT "          2.0"
810 GO TO 830
820 PRINT "          3"
830 MOVE 0,57
840 GO TO I3 OF 850,870,850,890
850 PRINT "          0.6"
860 GO TO 900
870 PRINT "          1.5"
880 GO TO 900
890 PRINT "          2"
900 MOVE 0,41
910 GO TO I3 OF 920,940,920,960
920 PRINT "          0.4"
930 GO TO 970
940 PRINT "          1.0"
950 GO TO 970
960 PRINT "          1"
970 MOVE 0,25
980 GO TO I3 OF 990,1010,990,1030
990 PRINT "          0.2"
1000 GO TO 1040
1010 PRINT "          0.5"
1020 GO TO 1040
1030 PRINT "          0"
1040 MOVE 0,9
1050 IF I3=4 THEN 1080
1060 PRINT "          0"
1070 GO TO 1090
1080 PRINT "          -1"
1090 MOVE 0,6
1100 IMAGE 13X,3D,1D,13X,1D,13X,2D,12X,3D
1110 PRINT USING 1100:0,1,1,10,100
1120 VIEWPORT T(4),T(4)+T(5),T(14),T(14)+T(15)

```

```

1130 WINDOW T(6),T(6)+T(7),T(16),T(16)+T(17)
1140 AXIS 1,1
1150 VIEWPORT 30,130,0,90
1160 WINDOW 0,3.75,-0.625,5
1170 FOR I5=1 TO N5
1180 FIND I5+(J5-1)*6+1
1190 INPUT @33:A,N7
1200 A=10^(I5-4)
1210 I4=J5
1220 I4=I4 MIN 4
1230 FOR U1=1 TO 150
1240 INPUT @33:B,H,M2,E,S
1250 S=S*A5(I4)*A
1260 H=H*A6(I4)
1270 X1=(U1-1)*0.02
1280 E=E*A5(I4)*A6(I4)*A/10^(X1-1)
1290 IF S=0 THEN 1320
1300 M2=A7(I5,I4)/S-1
1310 GO TO 1330
1320 M2=0
1330 GO TO I3 OF 1340,1360,1380,1400
1340 Y1=S*5
1350 GO TO 1410
1360 Y1=H*2
1370 GO TO 1410
1380 Y1=E*5
1390 GO TO 1410
1400 Y1=M2+1
1410 MOVE X1,Y1
1420 RDRAW 0,0
1430 NEXT U1
1440 NEXT I5
1450 VIEWPORT 0,130,0,100
1460 WINDOW 0,130,0,100
1470 HOME
1480 MOVE 0,48
1490 GO TO I3 OF 1500,1520,1550,1580
1500 PRINT "CONDUCTIVITY"
1510 GO TO 1600
1520 PRINT "  HALL"
1530 PRINT "COEFFICIENT"
1540 GO TO 1600
1550 PRINT "  HALL"
1560 PRINT "MOBILITY"
1570 GO TO 1600
1580 PRINT "  MAGNETO-"
1590 PRINT "RESISTANCE"
1600 PRINT "  RATIO"
1610 MOVE 47,1
1620 PRINT "MAGNETIC FIELD PARAMETER (BETA)";
1630 HOME
1640 GO TO I3 OF 1650,1670,1690,1710
1650 PRINT "THE CONDUCTIVITY";

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```
1660 GO TO 1720
1670 PRINT "THE HALL COEFFICIENT";
1680 GO TO 1720
1690 PRINT "THE HALL MOBILITY";
1700 GO TO 1720
1710 PRINT "THE MAGNETORESISTANCE";
1720 PRINT " " "RATIO VERSUS THE MAGNETIC"
1730 PRINT "FIELD PARAMETER FOR SEVERAL VALUES OF THE THICKNESS"
1740 PRINT "RATIO WITH THE POWER INDEX =";
1750 IF J5=4 THEN 1780
1760 PRINT J5-2;
1770 GO TO 1790
1780 PRINT J5-1;
1790 PRINT ". ";
1800 COPY
1810 NEXT J5
1820 HOME
1830 NEXT I3
1840 END
```


APPENDIX B

VALUES OF THE PARAMETRIC INTEGRALS

Zero-Magnetic-Field Limit

The values of the zero-magnetic-field limit of the third parametric integral are given on pages 97 to 116. There is a set of values of the parametric integral for each of the four possible values of the power index. Each set consists of values of the parametric integral for several values of the thickness ratio from 0,001 to 100,

Low Magnetic Field

The values of the three parametric integrals are given on pages 117 to 164. There is a set of values for each of the possible values of the power index and three values of the thickness ratio. Each set consists of values of the parametric integral for several values of the magnetic field parameter from 0,1 to 1000,

THE POWER INDEX IS -1.
THE MAGNETIC FIELD PARAMETER IS ZERO.

THICKNESS RATIO	RN3	IN3/BETA
1. 000E-003	1. 247E+005	-2. 217E+008
1. 059E-003	1. 111E+005	-1. 865E+008
1. 122E-003	9. 900E+004	-1. 569E+008
1. 189E-003	8. 821E+004	-1. 320E+008
1. 259E-003	7. 861E+004	-1. 111E+008
1. 334E-003	7. 004E+004	-9. 343E+007
1. 413E-003	6. 241E+004	-7. 861E+007
1. 496E-003	5. 561E+004	-6. 613E+007
1. 585E-003	4. 955E+004	-5. 564E+007
1. 679E-003	4. 415E+004	-4. 681E+007
1. 778E-003	3. 934E+004	-3. 938E+007
1. 884E-003	3. 505E+004	-3. 313E+007
1. 995E-003	3. 123E+004	-2. 787E+007
2. 113E-003	2. 783E+004	-2. 345E+007
2. 239E-003	2. 479E+004	-1. 972E+007
2. 371E-003	2. 209E+004	-1. 659E+007
2. 512E-003	1. 968E+004	-1. 396E+007
2. 661E-003	1. 753E+004	-1. 174E+007
2. 818E-003	1. 562E+004	-9. 877E+006
2. 985E-003	1. 392E+004	-8. 309E+006
3. 162E-003	1. 240E+004	-6. 989E+006
3. 350E-003	1. 104E+004	-5. 879E+006
3. 548E-003	9. 837E+003	-4. 946E+006
3. 758E-003	8. 762E+003	-4. 160E+006
3. 981E-003	7. 805E+003	-3. 499E+006
4. 217E-003	6. 952E+003	-2. 943E+006
4. 467E-003	6. 192E+003	-2. 476E+006
4. 732E-003	5. 515E+003	-2. 082E+006
5. 012E-003	4. 911E+003	-1. 751E+006
5. 309E-003	4. 374E+003	-1. 473E+006
5. 623E-003	3. 895E+003	-1. 239E+006
5. 957E-003	3. 468E+003	-1. 042E+006
6. 310E-003	3. 088E+003	-8. 762E+005
6. 683E-003	2. 750E+003	-7. 369E+005
7. 079E-003	2. 448E+003	-6. 197E+005
7. 499E-003	2. 180E+003	-5. 211E+005
7. 943E-003	1. 940E+003	-4. 382E+005
8. 414E-003	1. 727E+003	-3. 685E+005
8. 913E-003	1. 538E+003	-3. 098E+005
9. 441E-003	1. 368E+003	-2. 605E+005
1. 000E-002	1. 218E+003	-2. 190E+005
1. 059E-002	1. 084E+003	-1. 841E+005
1. 122E-002	9. 644E+002	-1. 548E+005
1. 189E-002	8. 581E+002	-1. 301E+005
1. 259E-002	7. 634E+002	-1. 094E+005
1. 334E-002	6. 791E+002	-9. 195E+004

THICKNESS RATIO	RN3	IN3/BETA
1. 413E-002	6. 041E+002	-7. 729E+004
1. 496E-002	5. 372E+002	-6. 496E+004
1. 585E-002	4. 777E+002	-5. 459E+004
1. 679E-002	4. 248E+002	-4. 587E+004
1. 778E-002	3. 777E+002	-3. 855E+004
1. 884E-002	3. 357E+002	-3. 239E+004
1. 995E-002	2. 984E+002	-2. 721E+004
2. 113E-002	2. 651E+002	-2. 286E+004
2. 239E-002	2. 356E+002	-1. 920E+004
2. 371E-002	2. 093E+002	-1. 613E+004
2. 512E-002	1. 859E+002	-1. 354E+004
2. 661E-002	1. 651E+002	-1. 137E+004
2. 818E-002	1. 465E+002	-9. 550E+003
2. 985E-002	1. 301E+002	-8. 017E+003
3. 162E-002	1. 154E+002	-6. 730E+003
3. 350E-002	1. 024E+002	-5. 648E+003
3. 548E-002	9. 084E+001	-4. 740E+003
3. 758E-002	8. 056E+001	-3. 977E+003
3. 981E-002	7. 141E+001	-3. 337E+003
4. 217E-002	6. 329E+001	-2. 799E+003
4. 467E-002	5. 608E+001	-2. 347E+003
4. 732E-002	4. 967E+001	-1. 968E+003
5. 012E-002	4. 397E+001	-1. 650E+003
5. 309E-002	3. 892E+001	-1. 382E+003
5. 623E-002	3. 444E+001	-1. 158E+003
5. 957E-002	3. 045E+001	-9. 704E+002
6. 310E-002	2. 692E+001	-8. 127E+002
6. 683E-002	2. 379E+001	-6. 804E+002
7. 079E-002	2. 101E+001	-5. 695E+002
7. 499E-002	1. 855E+001	-4. 765E+002
7. 943E-002	1. 637E+001	-3. 986E+002
8. 414E-002	1. 443E+001	-3. 333E+002
8. 913E-002	1. 272E+001	-2. 786E+002
9. 441E-002	1. 121E+001	-2. 328E+002
1. 000E-001	9. 864E+000	-1. 945E+002
1. 059E-001	8. 677E+000	-1. 623E+002
1. 122E-001	7. 628E+000	-1. 355E+002
1. 189E-001	6. 701E+000	-1. 130E+002
1. 259E-001	5. 883E+000	-9. 420E+001
1. 334E-001	5. 160E+000	-7. 849E+001
1. 413E-001	4. 522E+000	-6. 536E+001
1. 496E-001	3. 959E+000	-5. 440E+001
1. 585E-001	3. 464E+000	-4. 524E+001
1. 679E-001	3. 027E+000	-3. 761E+001
1. 778E-001	2. 643E+000	-3. 123E+001
1. 884E-001	2. 305E+000	-2. 592E+001
1. 995E-001	2. 008E+000	-2. 150E+001
2. 113E-001	1. 747E+000	-1. 781E+001

THICKNESS RATIO	RN3	IN3/BETA
2. 239E-001	1. 519E+000	-1. 475E+001
2. 371E-001	1. 318E+000	-1. 220E+001
2. 512E-001	1. 143E+000	-1. 008E+001
2. 661E-001	9. 890E-001	-8. 318E+000
2. 818E-001	8. 547E-001	-6. 858E+000
2. 985E-001	7. 376E-001	-5. 648E+000
3. 162E-001	6. 355E-001	-4. 645E+000
3. 350E-001	5. 465E-001	-3. 816E+000
3. 548E-001	4. 692E-001	-3. 130E+000
3. 758E-001	4. 021E-001	-2. 564E+000
3. 981E-001	3. 439E-001	-2. 097E+000
4. 217E-001	2. 935E-001	-1. 712E+000
4. 467E-001	2. 499E-001	-1. 396E+000
4. 732E-001	2. 124E-001	-1. 136E+000
5. 012E-001	1. 800E-001	-9. 223E-001
5. 309E-001	1. 522E-001	-7. 475E-001
5. 623E-001	1. 284E-001	-6. 046E-001
5. 957E-001	1. 080E-001	-4. 879E-001
6. 310E-001	9. 054E-002	-3. 928E-001
6. 683E-001	7. 570E-002	-3. 154E-001
7. 079E-001	6. 310E-002	-2. 526E-001
7. 499E-001	5. 242E-002	-2. 018E-001
7. 943E-001	4. 339E-002	-1. 607E-001
8. 414E-001	3. 579E-002	-1. 276E-001
8. 913E-001	2. 941E-002	-1. 009E-001
9. 441E-001	2. 407E-002	-7. 961E-002
1. 000E+000	1. 962E-002	-6. 255E-002
1. 059E+000	1. 592E-002	-4. 896E-002
1. 122E+000	1. 286E-002	-3. 817E-002
1. 189E+000	1. 034E-002	-2. 963E-002
1. 259E+000	8. 265E-003	-2. 290E-002
1. 334E+000	6. 575E-003	-1. 761E-002
1. 413E+000	5. 201E-003	-1. 348E-002
1. 496E+000	4. 090E-003	-1. 026E-002
1. 585E+000	3. 196E-003	-7. 766E-003
1. 679E+000	2. 482E-003	-5. 844E-003
1. 778E+000	1. 914E-003	-4. 371E-003
1. 884E+000	1. 466E-003	-3. 248E-003
1. 995E+000	1. 114E-003	-2. 397E-003
2. 113E+000	8. 401E-004	-1. 756E-003
2. 239E+000	6. 282E-004	-1. 276E-003
2. 371E+000	4. 657E-004	-9. 203E-004
2. 512E+000	3. 421E-004	-6. 579E-004
2. 661E+000	2. 489E-004	-4. 661E-004
2. 818E+000	1. 792E-004	-3. 271E-004
2. 985E+000	1. 277E-004	-2. 273E-004
3. 162E+000	8. 999E-005	-1. 562E-004
3. 350E+000	6. 266E-005	-1. 062E-004

THICKNESS RATIO	RN3	IN3/BETA
3. 548E+000	4. 309E-005	-7. 134E-005
3. 758E+000	2. 925E-005	-4. 732E-005
3. 981E+000	1. 958E-005	-3. 098E-005
4. 217E+000	1. 292E-005	-2. 000E-005
4. 467E+000	8. 395E-006	-1. 273E-005
4. 732E+000	5. 368E-006	-7. 972E-006
5. 012E+000	3. 374E-006	-4. 912E-006
5. 309E+000	2. 084E-006	-2. 975E-006
5. 623E+000	1. 262E-006	-1. 769E-006
5. 957E+000	7. 498E-007	-1. 031E-006
6. 310E+000	4. 361E-007	-5. 894E-007
6. 683E+000	2. 481E-007	-3. 295E-007
7. 079E+000	1. 378E-007	-1. 801E-007
7. 499E+000	7. 472E-008	-9. 607E-008
7. 943E+000	3. 947E-008	-4. 995E-008
8. 414E+000	2. 028E-008	-2. 528E-008
8. 913E+000	1. 012E-008	-1. 244E-008
9. 441E+000	4. 898E-009	-5. 935E-009
1. 000E+001	2. 295E-009	-2. 743E-009
1. 059E+001	1. 039E-009	-1. 226E-009
1. 122E+001	4. 537E-010	-5. 286E-010
1. 189E+001	1. 907E-010	-2. 194E-010
1. 259E+001	7. 696E-011	-8. 754E-011
1. 334E+001	2. 976E-011	-3. 347E-011
1. 413E+001	1. 100E-011	-1. 224E-011
1. 496E+001	3. 876E-012	-4. 267E-012
1. 585E+001	1. 299E-012	-1. 415E-012
1. 679E+001	4. 125E-013	-4. 451E-013
1. 778E+001	1. 238E-013	-1. 323E-013
1. 884E+001	3. 501E-014	-3. 707E-014
1. 995E+001	9. 294E-015	-9. 753E-015
2. 113E+001	2. 308E-015	-2. 400E-015
2. 239E+001	5. 339E-016	-5. 505E-016
2. 371E+001	1. 146E-016	-1. 172E-016
2. 512E+001	2. 274E-017	-2. 305E-017
2. 661E+001	4. 148E-018	-4. 169E-018
2. 818E+001	6. 926E-019	-6. 902E-019
2. 985E+001	1. 053E-019	-1. 040E-019
3. 162E+001	1. 449E-020	-1. 420E-020
3. 350E+001	1. 795E-021	-1. 744E-021
3. 548E+001	1. 988E-022	-1. 917E-022
3. 758E+001	1. 956E-023	-1. 872E-023
3. 981E+001	1. 696E-024	-1. 614E-024
4. 217E+001	1. 286E-025	-1. 219E-025
4. 467E+001	8. 455E-027	-8. 009E-027
4. 732E+001	4. 769E-028	-4. 536E-028
5. 012E+001	2. 283E-029	-2. 196E-029
5. 309E+001	9. 159E-031	-9. 001E-031

THICKNESS RATIO	RN3	IN3/BETA
5. 623E+001	3. 033E-032	-3. 095E-032
5. 957E+001	8. 139E-034	-8. 837E-034
6. 310E+001	1. 725E-035	-2. 071E-035
6. 683E+001	2. 776E-037	-3. 942E-037
7. 079E+001	3. 136E-039	-6. 015E-039
7. 499E+001	1. 932E-041	-7. 266E-041
7. 943E+001	-5. 855E-044	-6. 855E-043
8. 414E+001	-2. 798E-045	-4. 979E-045
8. 913E+001	-3. 292E-047	-2. 742E-047
9. 441E+001	-2. 305E-049	-1. 127E-049
1. 000E+002	1. 687E-027	-1. 561E-027

THE POWER INDEX IS 0.

THE MAGNETIC FIELD PARAMETER IS ZERO.

THICKNESS RATIO	RN3	IN3/BETA
1. 000E-003	2. 496E+005	-4. 996E+008
1. 059E-003	2. 224E+005	-4. 203E+008
1. 122E-003	1. 982E+005	-3. 536E+008
1. 189E-003	1. 766E+005	-2. 975E+008
1. 259E-003	1. 574E+005	-2. 503E+008
1. 334E-003	1. 403E+005	-2. 106E+008
1. 413E-003	1. 250E+005	-1. 772E+008
1. 496E-003	1. 114E+005	-1. 491E+008
1. 585E-003	9. 925E+004	-1. 254E+008
1. 679E-003	8. 844E+004	-1. 055E+008
1. 778E-003	7. 881E+004	-8. 877E+007
1. 884E-003	7. 023E+004	-7. 469E+007
1. 995E-003	6. 258E+004	-6. 284E+007
2. 113E-003	5. 576E+004	-5. 286E+007
2. 239E-003	4. 969E+004	-4. 447E+007
2. 371E-003	4. 427E+004	-3. 742E+007
2. 512E-003	3. 945E+004	-3. 148E+007
2. 661E-003	3. 515E+004	-2. 648E+007
2. 818E-003	3. 132E+004	-2. 228E+007
2. 985E-003	2. 790E+004	-1. 874E+007
3. 162E-003	2. 486E+004	-1. 577E+007
3. 350E-003	2. 215E+004	-1. 326E+007
3. 548E-003	1. 973E+004	-1. 116E+007
3. 758E-003	1. 758E+004	-9. 387E+006
3. 981E-003	1. 566E+004	-7. 897E+006
4. 217E-003	1. 395E+004	-6. 643E+006
4. 467E-003	1. 243E+004	-5. 588E+006
4. 732E-003	1. 107E+004	-4. 701E+006
5. 012E-003	9. 866E+003	-3. 954E+006
5. 309E-003	8. 788E+003	-3. 326E+006
5. 623E-003	7. 828E+003	-2. 798E+006
5. 957E-003	6. 973E+003	-2. 353E+006
6. 310E-003	6. 211E+003	-1. 979E+006
6. 683E-003	5. 532E+003	-1. 665E+006
7. 079E-003	4. 927E+003	-1. 400E+006
7. 499E-003	4. 388E+003	-1. 178E+006
7. 943E-003	3. 908E+003	-9. 906E+005
8. 414E-003	3. 480E+003	-8. 332E+005
8. 913E-003	3. 099E+003	-7. 007E+005
9. 441E-003	2. 759E+003	-5. 893E+005
1. 000E-002	2. 457E+003	-4. 956E+005
1. 059E-002	2. 188E+003	-4. 168E+005
1. 122E-002	1. 948E+003	-3. 505E+005
1. 189E-002	1. 734E+003	-2. 947E+005
1. 259E-002	1. 543E+003	-2. 478E+005
1. 334E-002	1. 374E+003	-2. 084E+005

THICKNESS RATIO	RN3	IN3/BETA
1. 413E-002	1. 223E+003	-1. 752E+005
1. 496E-002	1. 088E+003	-1. 473E+005
1. 585E-002	9. 685E+002	-1. 238E+005
1. 679E-002	8. 618E+002	-1. 041E+005
1. 778E-002	7. 668E+002	-8. 753E+004
1. 884E-002	6. 822E+002	-7. 358E+004
1. 995E-002	6. 069E+002	-6. 185E+004
2. 113E-002	5. 398E+002	-5. 198E+004
2. 239E-002	4. 801E+002	-4. 369E+004
2. 371E-002	4. 270E+002	-3. 672E+004
2. 512E-002	3. 797E+002	-3. 086E+004
2. 661E-002	3. 376E+002	-2. 593E+004
2. 818E-002	3. 001E+002	-2. 179E+004
2. 985E-002	2. 667E+002	-1. 830E+004
3. 162E-002	2. 370E+002	-1. 538E+004
3. 350E-002	2. 106E+002	-1. 292E+004
3. 548E-002	1. 871E+002	-1. 085E+004
3. 758E-002	1. 662E+002	-9. 111E+003
3. 981E-002	1. 476E+002	-7. 651E+003
4. 217E-002	1. 310E+002	-6. 424E+003
4. 467E-002	1. 163E+002	-5. 393E+003
4. 732E-002	1. 032E+002	-4. 528E+003
5. 012E-002	9. 160E+001	-3. 800E+003
5. 309E-002	8. 126E+001	-3. 189E+003
5. 623E-002	7. 206E+001	-2. 676E+003
5. 957E-002	6. 389E+001	-2. 245E+003
6. 310E-002	5. 663E+001	-1. 883E+003
6. 683E-002	5. 018E+001	-1. 579E+003
7. 079E-002	4. 445E+001	-1. 324E+003
7. 499E-002	3. 936E+001	-1. 110E+003
7. 943E-002	3. 485E+001	-9. 304E+002
8. 414E-002	3. 084E+001	-7. 797E+002
8. 913E-002	2. 728E+001	-6. 532E+002
9. 441E-002	2. 412E+001	-5. 471E+002
1. 000E-001	2. 132E+001	-4. 581E+002
1. 059E-001	1. 883E+001	-3. 834E+002
1. 122E-001	1. 663E+001	-3. 209E+002
1. 189E-001	1. 468E+001	-2. 684E+002
1. 259E-001	1. 295E+001	-2. 245E+002
1. 334E-001	1. 142E+001	-1. 877E+002
1. 413E-001	1. 006E+001	-1. 568E+002
1. 496E-001	8. 860E+000	-1. 310E+002
1. 585E-001	7. 797E+000	-1. 094E+002
1. 679E-001	6. 858E+000	-9. 132E+001
1. 778E-001	6. 028E+000	-7. 618E+001
1. 884E-001	5. 295E+000	-6. 353E+001
1. 995E-001	4. 647E+000	-5. 295E+001
2. 113E-001	4. 075E+000	-4. 410E+001

THICKNESS RATIO	RN3	IN3/BETA
2. 239E-001	3. 571E+000	-3. 672E+001
2. 371E-001	3. 127E+000	-3. 055E+001
2. 512E-001	2. 735E+000	-2. 540E+001
2. 661E-001	2. 390E+000	-2. 111E+001
2. 818E-001	2. 087E+000	-1. 753E+001
2. 985E-001	1. 820E+000	-1. 454E+001
3. 162E-001	1. 586E+000	-1. 206E+001
3. 350E-001	1. 380E+000	-9. 987E+000
3. 548E-001	1. 200E+000	-8. 266E+000
3. 758E-001	1. 041E+000	-6. 835E+000
3. 981E-001	9. 030E-001	-5. 647E+000
4. 217E-001	7. 819E-001	-4. 660E+000
4. 467E-001	6. 761E-001	-3. 842E+000
4. 732E-001	5. 837E-001	-3. 163E+000
5. 012E-001	5. 033E-001	-2. 602E+000
5. 309E-001	4. 332E-001	-2. 137E+000
5. 623E-001	3. 722E-001	-1. 753E+000
5. 957E-001	3. 193E-001	-1. 436E+000
6. 310E-001	2. 734E-001	-1. 175E+000
6. 683E-001	2. 337E-001	-9. 598E-001
7. 079E-001	1. 993E-001	-7. 828E-001
7. 499E-001	1. 697E-001	-6. 373E-001
7. 943E-001	1. 441E-001	-5. 179E-001
8. 414E-001	1. 221E-001	-4. 201E-001
8. 913E-001	1. 033E-001	-3. 402E-001
9. 441E-001	8. 710E-002	-2. 748E-001
1. 000E+000	7. 328E-002	-2. 216E-001
1. 059E+000	6. 149E-002	-1. 783E-001
1. 122E+000	5. 146E-002	-1. 431E-001
1. 189E+000	4. 294E-002	-1. 145E-001
1. 259E+000	3. 572E-002	-9. 145E-002
1. 334E+000	2. 963E-002	-7. 283E-002
1. 413E+000	2. 449E-002	-5. 783E-002
1. 496E+000	2. 018E-002	-4. 579E-002
1. 585E+000	1. 657E-002	-3. 614E-002
1. 679E+000	1. 355E-002	-2. 843E-002
1. 778E+000	1. 104E-002	-2. 229E-002
1. 884E+000	8. 963E-003	-1. 742E-002
1. 995E+000	7. 245E-003	-1. 356E-002
2. 113E+000	5. 831E-003	-1. 051E-002
2. 239E+000	4. 672E-003	-8. 116E-003
2. 371E+000	3. 726E-003	-6. 240E-003
2. 512E+000	2. 958E-003	-4. 777E-003
2. 661E+000	2. 336E-003	-3. 640E-003
2. 818E+000	1. 835E-003	-2. 760E-003
2. 985E+000	1. 434E-003	-2. 082E-003
3. 162E+000	1. 114E-003	-1. 562E-003
3. 350E+000	8. 602E-004	-1. 166E-003

THICKNESS RATIO	RN3	IN3/BETA
3. 548E+000	6. 603E-004	-8. 652E-004
3. 758E+000	5. 036E-004	-6. 381E-004
3. 981E+000	3. 816E-004	-4. 677E-004
4. 217E+000	2. 871E-004	-3. 406E-004
4. 467E+000	2. 145E-004	-2. 463E-004
4. 732E+000	1. 591E-004	-1. 769E-004
5. 012E+000	1. 170E-004	-1. 261E-004
5. 309E+000	8. 542E-005	-8. 917E-005
5. 623E+000	6. 182E-005	-6. 256E-005
5. 957E+000	4. 436E-005	-4. 353E-005
6. 310E+000	3. 154E-005	-3. 002E-005
6. 683E+000	2. 221E-005	-2. 052E-005
7. 079E+000	1. 549E-005	-1. 389E-005
7. 499E+000	1. 070E-005	-9. 310E-006
7. 943E+000	7. 306E-006	-6. 177E-006
8. 414E+000	4. 936E-006	-4. 054E-006
8. 913E+000	3. 297E-006	-2. 631E-006
9. 441E+000	2. 176E-006	-1. 688E-006
1. 000E+001	1. 419E-006	-1. 070E-006
1. 059E+001	9. 130E-007	-6. 698E-007
1. 122E+001	5. 797E-007	-4. 138E-007
1. 189E+001	3. 631E-007	-2. 521E-007
1. 259E+001	2. 241E-007	-1. 515E-007
1. 334E+001	1. 363E-007	-8. 968E-008
1. 413E+001	8. 158E-008	-5. 228E-008
1. 496E+001	4. 805E-008	-2. 999E-008
1. 585E+001	2. 783E-008	-1. 692E-008
1. 679E+001	1. 584E-008	-9. 386E-009
1. 778E+001	8. 852E-009	-5. 112E-009
1. 884E+001	4. 854E-009	-2. 733E-009
1. 995E+001	2. 610E-009	-1. 433E-009
2. 113E+001	1. 375E-009	-7. 362E-010
2. 239E+001	7. 091E-010	-3. 704E-010
2. 371E+001	3. 577E-010	-1. 823E-010
2. 512E+001	1. 764E-010	-8. 770E-011
2. 661E+001	8. 491E-011	-4. 121E-011
2. 818E+001	3. 988E-011	-1. 889E-011
2. 985E+001	1. 825E-011	-8. 442E-012
3. 162E+001	8. 134E-012	-3. 673E-012
3. 350E+001	3. 525E-012	-1. 555E-012
3. 548E+001	1. 484E-012	-6. 394E-013
3. 758E+001	6. 065E-013	-2. 552E-013
3. 981E+001	2. 402E-013	-9. 876E-014
4. 217E+001	9. 209E-014	-3. 700E-014
4. 467E+001	3. 414E-014	-1. 341E-014
4. 732E+001	1. 222E-014	-4. 690E-015
5. 012E+001	4. 218E-015	-1. 582E-015
5. 309E+001	1. 402E-015	-5. 142E-016

THICKNESS RATIO	RN3	IN3/BETA
5. 623E+001	4. 481E-016	-1. 606E-016
5. 957E+001	1. 375E-016	-4. 819E-017
6. 310E+001	4. 043E-017	-1. 386E-017
6. 683E+001	1. 138E-017	-3. 813E-018
7. 079E+001	3. 058E-018	-1. 002E-018
7. 499E+001	7. 839E-019	-2. 512E-019
7. 943E+001	1. 913E-019	-5. 993E-020
8. 414E+001	4. 433E-020	-1. 358E-020
8. 913E+001	9. 741E-021	-2. 919E-021
9. 441E+001	2. 025E-021	-5. 933E-022
1. 000E+002	3. 974E-022	-1. 139E-022

THE POWER INDEX IS 1.
THE MAGNETIC FIELD PARAMETER IS ZERO.

THICKNESS RATIO	RN3	IN3/BETA
1. 000E-003	7. 493E+005	-2. 907E+009
1. 059E-003	6. 678E+005	-2. 446E+009
1. 122E-003	5. 952E+005	-2. 058E+009
1. 189E-003	5. 304E+005	-1. 731E+009
1. 259E-003	4. 727E+005	-1. 457E+009
1. 334E-003	4. 213E+005	-1. 226E+009
1. 413E-003	3. 754E+005	-1. 031E+009
1. 496E-003	3. 346E+005	-8. 676E+008
1. 585E-003	2. 982E+005	-7. 300E+008
1. 679E-003	2. 657E+005	-6. 142E+008
1. 778E-003	2. 368E+005	-5. 168E+008
1. 884E-003	2. 110E+005	-4. 348E+008
1. 995E-003	1. 881E+005	-3. 658E+008
2. 113E-003	1. 676E+005	-3. 078E+008
2. 239E-003	1. 493E+005	-2. 589E+008
2. 371E-003	1. 331E+005	-2. 179E+008
2. 512E-003	1. 186E+005	-1. 833E+008
2. 661E-003	1. 057E+005	-1. 542E+008
2. 818E-003	9. 418E+004	-1. 298E+008
2. 985E-003	8. 393E+004	-1. 092E+008
3. 162E-003	7. 479E+004	-9. 185E+007
3. 350E-003	6. 665E+004	-7. 727E+007
3. 548E-003	5. 939E+004	-6. 501E+007
3. 758E-003	5. 292E+004	-5. 470E+007
3. 981E-003	4. 716E+004	-4. 602E+007
4. 217E-003	4. 202E+004	-3. 872E+007
4. 467E-003	3. 744E+004	-3. 257E+007
4. 732E-003	3. 336E+004	-2. 740E+007
5. 012E-003	2. 973E+004	-2. 305E+007
5. 309E-003	2. 649E+004	-1. 940E+007
5. 623E-003	2. 360E+004	-1. 632E+007
5. 957E-003	2. 103E+004	-1. 373E+007
6. 310E-003	1. 873E+004	-1. 155E+007
6. 683E-003	1. 669E+004	-9. 716E+006
7. 079E-003	1. 487E+004	-8. 174E+006
7. 499E-003	1. 325E+004	-6. 876E+006
7. 943E-003	1. 180E+004	-5. 785E+006
8. 414E-003	1. 052E+004	-4. 866E+006
8. 913E-003	9. 369E+003	-4. 094E+006
9. 441E-003	8. 346E+003	-3. 444E+006
1. 000E-002	7. 435E+003	-2. 897E+006
1. 059E-002	6. 623E+003	-2. 437E+006
1. 122E-002	5. 899E+003	-2. 050E+006
1. 189E-002	5. 255E+003	-1. 724E+006
1. 259E-002	4. 681E+003	-1. 450E+006
1. 334E-002	4. 169E+003	-1. 220E+006

THICKNESS RATIO	RN3	IN3/BETA
1. 413E-002	3. 713E+003	-1. 026E+006
1. 496E-002	3. 307E+003	-8. 632E+005
1. 585E-002	2. 945E+003	-7. 260E+005
1. 679E-002	2. 623E+003	-6. 107E+005
1. 778E-002	2. 335E+003	-5. 136E+005
1. 884E-002	2. 080E+003	-4. 320E+005
1. 995E-002	1. 852E+003	-3. 633E+005
2. 113E-002	1. 649E+003	-3. 056E+005
2. 239E-002	1. 468E+003	-2. 570E+005
2. 371E-002	1. 307E+003	-2. 161E+005
2. 512E-002	1. 163E+003	-1. 817E+005
2. 661E-002	1. 035E+003	-1. 528E+005
2. 818E-002	9. 216E+002	-1. 285E+005
2. 985E-002	8. 203E+002	-1. 081E+005
3. 162E-002	7. 300E+002	-9. 086E+004
3. 350E-002	6. 496E+002	-7. 639E+004
3. 548E-002	5. 780E+002	-6. 423E+004
3. 758E-002	5. 143E+002	-5. 400E+004
3. 981E-002	4. 575E+002	-4. 540E+004
4. 217E-002	4. 070E+002	-3. 816E+004
4. 467E-002	3. 620E+002	-3. 208E+004
4. 732E-002	3. 219E+002	-2. 696E+004
5. 012E-002	2. 862E+002	-2. 266E+004
5. 309E-002	2. 545E+002	-1. 905E+004
5. 623E-002	2. 263E+002	-1. 601E+004
5. 957E-002	2. 011E+002	-1. 345E+004
6. 310E-002	1. 787E+002	-1. 130E+004
6. 683E-002	1. 588E+002	-9. 497E+003
7. 079E-002	1. 411E+002	-7. 979E+003
7. 499E-002	1. 254E+002	-6. 703E+003
7. 943E-002	1. 113E+002	-5. 631E+003
8. 414E-002	9. 886E+001	-4. 729E+003
8. 913E-002	8. 777E+001	-3. 972E+003
9. 441E-002	7. 790E+001	-3. 335E+003
1. 000E-001	6. 913E+001	-2. 800E+003
1. 059E-001	6. 134E+001	-2. 351E+003
1. 122E-001	5. 441E+001	-1. 973E+003
1. 189E-001	4. 825E+001	-1. 656E+003
1. 259E-001	4. 277E+001	-1. 390E+003
1. 334E-001	3. 791E+001	-1. 166E+003
1. 413E-001	3. 359E+001	-9. 785E+002
1. 496E-001	2. 975E+001	-8. 207E+002
1. 585E-001	2. 635E+001	-6. 883E+002
1. 679E-001	2. 332E+001	-5. 771E+002
1. 778E-001	2. 064E+001	-4. 838E+002
1. 884E-001	1. 825E+001	-4. 055E+002
1. 995E-001	1. 614E+001	-3. 398E+002
2. 113E-001	1. 426E+001	-2. 847E+002

THICKNESS RATIO	RN3	IN3/BETA
2. 239E-001	1. 260E+001	-2. 384E+002
2. 371E-001	1. 113E+001	-1. 996E+002
2. 512E-001	9. 823E+000	-1. 671E+002
2. 661E-001	8. 666E+000	-1. 399E+002
2. 818E-001	7. 642E+000	-1. 170E+002
2. 985E-001	6. 735E+000	-9. 786E+001
3. 162E-001	5. 932E+000	-8. 182E+001
3. 350E-001	5. 222E+000	-6. 838E+001
3. 548E-001	4. 594E+000	-5. 713E+001
3. 758E-001	4. 039E+000	-4. 771E+001
3. 981E-001	3. 549E+000	-3. 982E+001
4. 217E-001	3. 116E+000	-3. 323E+001
4. 467E-001	2. 734E+000	-2. 771E+001
4. 732E-001	2. 397E+000	-2. 310E+001
5. 012E-001	2. 100E+000	-1. 925E+001
5. 309E-001	1. 838E+000	-1. 603E+001
5. 623E-001	1. 608E+000	-1. 334E+001
5. 957E-001	1. 405E+000	-1. 110E+001
6. 310E-001	1. 226E+000	-9. 224E+000
6. 683E-001	1. 070E+000	-7. 662E+000
7. 079E-001	9. 320E-001	-6. 361E+000
7. 499E-001	8. 112E-001	-5. 276E+000
7. 943E-001	7. 053E-001	-4. 373E+000
8. 414E-001	6. 125E-001	-3. 622E+000
8. 913E-001	5. 313E-001	-2. 998E+000
9. 441E-001	4. 604E-001	-2. 479E+000
1. 000E+000	3. 984E-001	-2. 047E+000
1. 059E+000	3. 443E-001	-1. 690E+000
1. 122E+000	2. 971E-001	-1. 393E+000
1. 189E+000	2. 560E-001	-1. 147E+000
1. 259E+000	2. 203E-001	-9. 438E-001
1. 334E+000	1. 893E-001	-7. 756E-001
1. 413E+000	1. 624E-001	-6. 365E-001
1. 496E+000	1. 391E-001	-5. 217E-001
1. 585E+000	1. 189E-001	-4. 271E-001
1. 679E+000	1. 015E-001	-3. 492E-001
1. 778E+000	8. 646E-002	-2. 850E-001
1. 884E+000	7. 351E-002	-2. 323E-001
1. 995E+000	6. 239E-002	-1. 891E-001
2. 113E+000	5. 284E-002	-1. 536E-001
2. 239E+000	4. 465E-002	-1. 246E-001
2. 371E+000	3. 766E-002	-1. 009E-001
2. 512E+000	3. 168E-002	-8. 151E-002
2. 661E+000	2. 660E-002	-6. 575E-002
2. 818E+000	2. 227E-002	-5. 292E-002
2. 985E+000	1. 861E-002	-4. 251E-002
3. 162E+000	1. 550E-002	-3. 407E-002
3. 350E+000	1. 268E-002	-2. 725E-002

THICKNESS RATIO	RNG	INS/BETA
3. 548E+000	1. 067E-002	-2. 174E-002
3. 758E+000	8. 820E-003	-1. 730E-002
3. 981E+000	7. 266E-003	-1. 373E-002
4. 217E+000	5. 968E-003	-1. 087E-002
4. 467E+000	4. 886E-003	-8. 586E-003
4. 732E+000	3. 988E-003	-6. 759E-003
5. 012E+000	3. 244E-003	-5. 306E-003
5. 309E+000	2. 629E-003	-4. 152E-003
5. 623E+000	2. 123E-003	-3. 239E-003
5. 957E+000	1. 709E-003	-2. 518E-003
6. 310E+000	1. 370E-003	-1. 951E-003
6. 683E+000	1. 094E-003	-1. 506E-003
7. 079E+000	8. 695E-004	-1. 159E-003
7. 499E+000	6. 886E-004	-8. 877E-004
7. 943E+000	5. 429E-004	-6. 775E-004
8. 414E+000	4. 261E-004	-5. 150E-004
8. 913E+000	3. 329E-004	-3. 898E-004
9. 441E+000	2. 589E-004	-2. 937E-004
1. 000E+001	2. 003E-004	-2. 203E-004
1. 059E+001	1. 542E-004	-1. 645E-004
1. 122E+001	1. 181E-004	-1. 222E-004
1. 189E+001	8. 997E-005	-9. 033E-005
1. 259E+001	6. 816E-005	-6. 643E-005
1. 334E+001	5. 134E-005	-4. 859E-005
1. 413E+001	3. 844E-005	-3. 534E-005
1. 496E+001	2. 861E-005	-2. 556E-005
1. 585E+001	2. 116E-005	-1. 837E-005
1. 679E+001	1. 555E-005	-1. 313E-005
1. 778E+001	1. 135E-005	-9. 320E-006
1. 884E+001	8. 230E-006	-6. 574E-006
1. 995E+001	5. 925E-006	-4. 605E-006
2. 113E+001	4. 235E-006	-3. 204E-006
2. 239E+001	3. 004E-006	-2. 213E-006
2. 371E+001	2. 114E-006	-1. 517E-006
2. 512E+001	1. 477E-006	-1. 032E-006
2. 661E+001	1. 023E-006	-6. 967E-007
2. 818E+001	7. 024E-007	-4. 664E-007
2. 985E+001	4. 782E-007	-3. 097E-007
3. 162E+001	3. 227E-007	-2. 038E-007
3. 350E+001	2. 157E-007	-1. 329E-007
3. 548E+001	1. 429E-007	-8. 589E-008
3. 758E+001	9. 371E-008	-5. 498E-008
3. 981E+001	6. 084E-008	-3. 485E-008
4. 217E+001	3. 909E-008	-2. 186E-008
4. 467E+001	2. 485E-008	-1. 358E-008
4. 732E+001	1. 563E-008	-8. 339E-009
5. 012E+001	9. 715E-009	-5. 066E-009
5. 309E+001	5. 970E-009	-3. 042E-009

THICKNESS RATIO	RN3	IN3/BETA
5. 623E+001	3. 625E-009	-1. 806E-009
5. 957E+001	2. 174E-009	-1. 059E-009
6. 310E+001	1. 287E-009	-6. 131E-010
6. 683E+001	7. 522E-010	-3. 504E-010
7. 079E+001	4. 337E-010	-1. 977E-010
7. 499E+001	2. 466E-010	-1. 100E-010
7. 943E+001	1. 383E-010	-6. 034E-011
8. 414E+001	7. 637E-011	-3. 262E-011
8. 913E+001	4. 155E-011	-1. 738E-011
9. 441E+001	2. 226E-011	-9. 115E-012
1. 000E+002	1. 173E-011	-4. 705E-012

THE POWER INDEX IS 3.
THE MAGNETIC FIELD PARAMETER IS ZERO.

THICKNESS RATIO	RN3	IN3/BETA
1. 000E-003	1. 500E+007	-4. 678E+011
1. 059E-003	1. 337E+007	-3. 936E+011
1. 122E-003	1. 191E+007	-3. 312E+011
1. 189E-003	1. 062E+007	-2. 786E+011
1. 259E-003	9. 463E+006	-2. 345E+011
1. 334E-003	8. 434E+006	-1. 973E+011
1. 413E-003	7. 516E+006	-1. 660E+011
1. 496E-003	6. 699E+006	-1. 397E+011
1. 585E-003	5. 970E+006	-1. 175E+011
1. 679E-003	5. 321E+006	-9. 887E+010
1. 778E-003	4. 742E+006	-8. 318E+010
1. 884E-003	4. 227E+006	-6. 999E+010
1. 995E-003	3. 767E+006	-5. 889E+010
2. 113E-003	3. 357E+006	-4. 955E+010
2. 239E-003	2. 992E+006	-4. 169E+010
2. 371E-003	2. 667E+006	-3. 508E+010
2. 512E-003	2. 377E+006	-2. 951E+010
2. 661E-003	2. 118E+006	-2. 483E+010
2. 818E-003	1. 888E+006	-2. 089E+010
2. 985E-003	1. 682E+006	-1. 758E+010
3. 162E-003	1. 499E+006	-1. 479E+010
3. 350E-003	1. 336E+006	-1. 245E+010
3. 548E-003	1. 191E+006	-1. 047E+010
3. 758E-003	1. 061E+006	-8. 811E+009
3. 981E-003	9. 459E+005	-7. 413E+009
4. 217E-003	8. 430E+005	-6. 237E+009
4. 467E-003	7. 513E+005	-5. 248E+009
4. 732E-003	6. 696E+005	-4. 416E+009
5. 012E-003	5. 968E+005	-3. 715E+009
5. 309E-003	5. 318E+005	-3. 126E+009
5. 623E-003	4. 740E+005	-2. 630E+009
5. 957E-003	4. 224E+005	-2. 213E+009
6. 310E-003	3. 765E+005	-1. 862E+009
6. 683E-003	3. 355E+005	-1. 567E+009
7. 079E-003	2. 990E+005	-1. 318E+009
7. 499E-003	2. 665E+005	-1. 109E+009
7. 943E-003	2. 375E+005	-9. 331E+008
8. 414E-003	2. 116E+005	-7. 851E+008
8. 913E-003	1. 886E+005	-6. 606E+008
9. 441E-003	1. 681E+005	-5. 558E+008
1. 000E-002	1. 498E+005	-4. 676E+008
1. 059E-002	1. 335E+005	-3. 935E+008
1. 122E-002	1. 190E+005	-3. 310E+008
1. 189E-002	1. 060E+005	-2. 785E+008
1. 259E-002	9. 449E+004	-2. 344E+008
1. 334E-002	8. 420E+004	-1. 972E+008

THICKNESS RATIO	RNB	IN3/BETA
1. 413E-002	7. 504E+004	-1. 659E+008
1. 496E-002	6. 687E+004	-1. 396E+008
1. 585E-002	5. 959E+004	-1. 174E+008
1. 679E-002	5. 310E+004	-9. 881E+007
1. 778E-002	4. 732E+004	-8. 314E+007
1. 884E-002	4. 217E+004	-6. 995E+007
1. 995E-002	3. 758E+004	-5. 885E+007
2. 113E-002	3. 349E+004	-4. 951E+007
2. 239E-002	2. 984E+004	-4. 166E+007
2. 371E-002	2. 659E+004	-3. 505E+007
2. 512E-002	2. 370E+004	-2. 949E+007
2. 661E-002	2. 111E+004	-2. 481E+007
2. 818E-002	1. 881E+004	-2. 087E+007
2. 985E-002	1. 676E+004	-1. 756E+007
3. 162E-002	1. 494E+004	-1. 478E+007
3. 350E-002	1. 331E+004	-1. 243E+007
3. 548E-002	1. 186E+004	-1. 046E+007
3. 758E-002	1. 057E+004	-8. 800E+006
3. 981E-002	9. 415E+003	-7. 403E+006
4. 217E-002	8. 389E+003	-6. 229E+006
4. 467E-002	7. 474E+003	-5. 240E+006
4. 732E-002	6. 659E+003	-4. 409E+006
5. 012E-002	5. 933E+003	-3. 709E+006
5. 309E-002	5. 286E+003	-3. 120E+006
5. 623E-002	4. 709E+003	-2. 625E+006
5. 957E-002	4. 195E+003	-2. 209E+006
6. 310E-002	3. 737E+003	-1. 858E+006
6. 683E-002	3. 329E+003	-1. 563E+006
7. 079E-002	2. 966E+003	-1. 315E+006
7. 499E-002	2. 642E+003	-1. 106E+006
7. 943E-002	2. 353E+003	-9. 307E+005
8. 414E-002	2. 096E+003	-7. 829E+005
8. 913E-002	1. 867E+003	-6. 586E+005
9. 441E-002	1. 663E+003	-5. 540E+005
1. 000E-001	1. 481E+003	-4. 661E+005
1. 059E-001	1. 319E+003	-3. 921E+005
1. 122E-001	1. 175E+003	-3. 298E+005
1. 189E-001	1. 046E+003	-2. 774E+005
1. 259E-001	9. 314E+002	-2. 334E+005
1. 334E-001	8. 294E+002	-1. 963E+005
1. 413E-001	7. 385E+002	-1. 651E+005
1. 496E-001	6. 575E+002	-1. 389E+005
1. 585E-001	5. 854E+002	-1. 168E+005
1. 679E-001	5. 211E+002	-9. 826E+004
1. 778E-001	4. 639E+002	-8. 264E+004
1. 884E-001	4. 129E+002	-6. 951E+004
1. 995E-001	3. 675E+002	-5. 846E+004
2. 113E-001	3. 271E+002	-4. 917E+004

THICKNESS RATIO	RN3	IN3/BETA
2. 239E-001	2. 911E+002	-4. 135E+004
2. 371E-001	2. 590E+002	-3. 477E+004
2. 512E-001	2. 305E+002	-2. 924E+004
2. 661E-001	2. 051E+002	-2. 459E+004
2. 818E-001	1. 824E+002	-2. 068E+004
2. 985E-001	1. 623E+002	-1. 739E+004
3. 162E-001	1. 443E+002	-1. 462E+004
3. 350E-001	1. 284E+002	-1. 229E+004
3. 548E-001	1. 141E+002	-1. 034E+004
3. 758E-001	1. 015E+002	-8. 691E+003
3. 981E-001	9. 023E+001	-7. 306E+003
4. 217E-001	8. 021E+001	-6. 142E+003
4. 467E-001	7. 129E+001	-5. 163E+003
4. 732E-001	6. 335E+001	-4. 340E+003
5. 012E-001	5. 629E+001	-3. 648E+003
5. 309E-001	5. 001E+001	-3. 066E+003
5. 623E-001	4. 442E+001	-2. 577E+003
5. 957E-001	3. 945E+001	-2. 166E+003
6. 310E-001	3. 503E+001	-1. 820E+003
6. 683E-001	3. 110E+001	-1. 529E+003
7. 079E-001	2. 760E+001	-1. 285E+003
7. 499E-001	2. 449E+001	-1. 079E+003
7. 943E-001	2. 173E+001	-9. 067E+002
8. 414E-001	1. 927E+001	-7. 616E+002
8. 913E-001	1. 709E+001	-6. 397E+002
9. 441E-001	1. 515E+001	-5. 372E+002
1. 000E+000	1. 343E+001	-4. 511E+002
1. 059E+000	1. 190E+001	-3. 788E+002
1. 122E+000	1. 054E+001	-3. 180E+002
1. 189E+000	9. 338E+000	-2. 669E+002
1. 259E+000	8. 267E+000	-2. 240E+002
1. 334E+000	7. 317E+000	-1. 880E+002
1. 413E+000	6. 474E+000	-1. 578E+002
1. 496E+000	5. 726E+000	-1. 323E+002
1. 585E+000	5. 062E+000	-1. 110E+002
1. 679E+000	4. 474E+000	-9. 310E+001
1. 778E+000	3. 953E+000	-7. 807E+001
1. 884E+000	3. 491E+000	-6. 545E+001
1. 995E+000	3. 081E+000	-5. 486E+001
2. 113E+000	2. 719E+000	-4. 597E+001
2. 239E+000	2. 398E+000	-3. 852E+001
2. 371E+000	2. 114E+000	-3. 226E+001
2. 512E+000	1. 862E+000	-2. 702E+001
2. 661E+000	1. 640E+000	-2. 262E+001
2. 818E+000	1. 444E+000	-1. 893E+001
2. 985E+000	1. 270E+000	-1. 584E+001
3. 162E+000	1. 117E+000	-1. 325E+001
3. 350E+000	9. 812E-001	-1. 108E+001

THICKNESS RATIO	RN3	IN3/BETA
3.548E+000	8.617E-001	-9.264E+000
3.758E+000	7.562E-001	-7.742E+000
3.981E+000	6.632E-001	-6.468E+000
4.217E+000	5.813E-001	-5.401E+000
4.467E+000	5.091E-001	-4.509E+000
4.732E+000	4.456E-001	-3.762E+000
5.012E+000	3.897E-001	-3.138E+000
5.309E+000	3.405E-001	-2.616E+000
5.623E+000	2.974E-001	-2.180E+000
5.957E+000	2.594E-001	-1.816E+000
6.310E+000	2.262E-001	-1.511E+000
6.683E+000	1.970E-001	-1.258E+000
7.079E+000	1.714E-001	-1.046E+000
7.499E+000	1.490E-001	-8.691E-001
7.943E+000	1.294E-001	-7.218E-001
8.414E+000	1.123E-001	-5.992E-001
8.913E+000	9.734E-002	-4.970E-001
9.441E+000	8.428E-002	-4.120E-001
1.000E+001	7.290E-002	-3.413E-001
1.059E+001	6.298E-002	-2.825E-001
1.122E+001	5.435E-002	-2.336E-001
1.189E+001	4.685E-002	-1.931E-001
1.259E+001	4.033E-002	-1.594E-001
1.334E+001	3.468E-002	-1.315E-001
1.413E+001	2.978E-002	-1.084E-001
1.496E+001	2.554E-002	-8.927E-002
1.585E+001	2.187E-002	-7.344E-002
1.679E+001	1.870E-002	-6.036E-002
1.778E+001	1.597E-002	-4.955E-002
1.884E+001	1.362E-002	-4.064E-002
1.995E+001	1.160E-002	-3.329E-002
2.113E+001	9.858E-003	-2.724E-002
2.239E+001	8.367E-003	-2.226E-002
2.371E+001	7.090E-003	-1.817E-002
2.512E+001	5.998E-003	-1.481E-002
2.661E+001	5.065E-003	-1.206E-002
2.818E+001	4.269E-003	-9.801E-003
2.985E+001	3.593E-003	-7.956E-003
3.162E+001	3.017E-003	-6.449E-003
3.350E+001	2.529E-003	-5.220E-003
3.548E+001	2.116E-003	-4.218E-003
3.758E+001	1.767E-003	-3.403E-003
3.981E+001	1.472E-003	-2.741E-003
4.217E+001	1.224E-003	-2.204E-003
4.467E+001	1.016E-003	-1.769E-003
4.732E+001	8.410E-004	-1.417E-003
5.012E+001	6.946E-004	-1.133E-003
5.309E+001	5.725E-004	-9.041E-004

THICKNESS RATIO	RN3	IN3/BETA
5. 623E+001	4. 707E-004	-7. 201E-004
5. 957E+001	3. 860E-004	-5. 723E-004
6. 310E+001	3. 158E-004	-4. 539E-004
6. 683E+001	2. 577E-004	-3. 592E-004
7. 079E+001	2. 098E-004	-2. 837E-004
7. 499E+001	1. 703E-004	-2. 235E-004
7. 943E+001	1. 379E-004	-1. 756E-004
8. 414E+001	1. 113E-004	-1. 377E-004
8. 913E+001	8. 962E-005	-1. 077E-004
9. 441E+001	7. 194E-005	-8. 401E-005
1. 000E+002	5. 758E-005	-6. 536E-005

ALPHA IS 1.000. SCATTERING INDEX IS -1

BETA	RN1	IN1	RN2	IN2	RN3	IN3
1000E+00	4952E+00	4366E-01	4858E+00	8592E-01	1804E-01	5593E-02
1047E+00	4947E+00	4564E-01	4845E+00	8970E-01	1793E-01	5836E-02
1096E+00	4942E+00	4771E-01	4830E+00	9363E-01	1782E-01	6088E-02
1143E+00	4937E+00	4987E-01	4815E+00	9770E-01	1769E-01	6348E-02
1202E+00	4931E+00	5212E-01	4798E+00	1019E+00	1755E-01	6617E-02
1259E+00	4925E+00	5446E-01	4780E+00	1063E+00	1740E-01	6894E-02
1318E+00	4918E+00	5689E-01	4761E+00	1108E+00	1724E-01	7179E-02
1380E+00	4910E+00	5943E-01	4739E+00	1155E+00	1706E-01	7473E-02
1445E+00	4902E+00	6206E-01	4716E+00	1203E+00	1687E-01	7774E-02
1514E+00	4893E+00	6479E-01	4692E+00	1253E+00	1666E-01	8083E-02
1585E+00	4883E+00	6763E-01	4665E+00	1304E+00	1644E-01	8398E-02
1660E+00	4873E+00	7057E-01	4636E+00	1357E+00	1620E-01	8720E-02
1738E+00	4861E+00	7363E-01	4605E+00	1411E+00	1593E-01	9047E-02
1820E+00	4849E+00	7679E-01	4571E+00	1467E+00	1565E-01	9379E-02
1905E+00	4836E+00	8006E-01	4535E+00	1524E+00	1534E-01	9714E-02
1995E+00	4821E+00	8345E-01	4496E+00	1582E+00	1502E-01	1005E-01
2089E+00	4806E+00	8695E-01	4454E+00	1642E+00	1466E-01	1039E-01
2188E+00	4789E+00	9056E-01	4410E+00	1702E+00	1429E-01	1073E-01
2291E+00	4771E+00	9429E-01	4362E+00	1764E+00	1388E-01	1106E-01
2399E+00	4751E+00	9812E-01	4311E+00	1827E+00	1345E-01	1140E-01
2512E+00	4730E+00	1021E+00	4256E+00	1890E+00	1300E-01	1172E-01
2630E+00	4708E+00	1061E+00	4197E+00	1954E+00	1251E-01	1204E-01
2754E+00	4683E+00	1103E+00	4135E+00	2019E+00	1199E-01	1234E-01
2884E+00	4657E+00	1146E+00	4069E+00	2084E+00	1145E-01	1263E-01
3020E+00	4629E+00	1189E+00	3998E+00	2148E+00	1087E-01	1291E-01
3162E+00	4599E+00	1234E+00	3923E+00	2213E+00	1027E-01	1316E-01
3311E+00	4567E+00	1280E+00	3844E+00	2277E+00	9638E-02	1340E-01
3467E+00	4532E+00	1326E+00	3761E+00	2340E+00	8978E-02	1360E-01
3631E+00	4496E+00	1373E+00	3672E+00	2402E+00	8291E-02	1378E-01
3802E+00	4456E+00	1421E+00	3579E+00	2463E+00	7579E-02	1392E-01
3981E+00	4415E+00	1469E+00	3482E+00	2521E+00	6845E-02	1403E-01
4168E+00	4371E+00	1518E+00	3380E+00	2578E+00	6090E-02	1410E-01
4365E+00	4324E+00	1566E+00	3273E+00	2631E+00	5318E-02	1413E-01
4571E+00	4274E+00	1616E+00	3161E+00	2682E+00	4532E-02	1411E-01
4786E+00	4221E+00	1665E+00	3045E+00	2729E+00	3736E-02	1404E-01
5013E+00	4165E+00	1714E+00	2925E+00	2772E+00	2934E-02	1392E-01
5243E+00	4107E+00	1762E+00	2801E+00	2811E+00	2131E-02	1375E-01
5485E+00	4045E+00	1810E+00	2673E+00	2844E+00	1331E-02	1352E-01
5754E+00	3980E+00	1857E+00	2542E+00	2873E+00	5413E-03	1324E-01
6026E+00	3913E+00	1904E+00	2407E+00	2896E+00	2340E-03	1291E-01
6310E+00	3842E+00	1949E+00	2270E+00	2913E+00	9885E-03	1252E-01
6607E+00	3768E+00	1992E+00	2131E+00	2924E+00	1716E-02	1207E-01
6918E+00	3691E+00	2034E+00	1990E+00	2928E+00	2411E-02	1157E-01
7244E+00	3611E+00	2074E+00	1848E+00	2925E+00	3067E-02	1103E-01
7586E+00	3529E+00	2113E+00	1705E+00	2915E+00	3678E-02	1043E-01
7943E+00	3443E+00	2148E+00	1562E+00	2898E+00	4239E-02	9792E-02
8318E+00	3355E+00	2181E+00	1420E+00	2874E+00	4745E-02	9114E-02
8710E+00	3265E+00	2212E+00	1280E+00	2842E+00	5190E-02	8404E-02
9120E+00	3173E+00	2239E+00	1141E+00	2803E+00	5570E-02	7667E-02
9550E+00	3078E+00	2264E+00	1005E+00	2757E+00	5883E-02	6910E-02
1000E+01	2982E+00	2285E+00	8722E-01	2704E+00	6126E-02	6141E-02
1047E+01	2884E+00	2302E+00	7435E-01	2645E+00	6297E-02	5366E-02
1096E+01	2785E+00	2316E+00	6193E-01	2579E+00	6396E-02	4594E-02
1148E+01	2685E+00	2327E+00	5003E-01	2507E+00	6423E-02	3833E-02
1203E+01	2584E+00	2333E+00	3870E-01	2430E+00	6379E-02	3091E-02
1259E+01	2482E+00	2335E+00	2798E-01	2347E+00	6268E-02	2377E-02
1318E+01	2381E+00	2334E+00	1792E-01	2261E+00	6093E-02	1696E-02
1380E+01	2280E+00	2329E+00	8554E-02	2171E+00	5859E-02	1058E-02
1445E+01	2179E+00	2319E+00	9567E-04	2077E+00	5572E-02	4667E-03
1514E+01	2079E+00	2306E+00	8007E-02	1981E+00	5238E-02	7117E-04

1585E+01	1980E+00	2290E+00	1517E-01	1884E+00	4864E-02	5514E-03
1660E+01	1883E+00	2269E+00	2158E-01	1786E+00	4459E-02	9707E-03
1738E+01	1787E+00	2245E+00	2724E-01	1687E+00	4031E-02	1327E-02
1820E+01	1693E+00	2218E+00	3216E-01	1588E+00	3583E-02	1619E-02
1905E+01	1601E+00	2187E+00	3637E-01	1491E+00	3139E-02	1847E-02
1995E+01	1512E+00	2154E+00	3989E-01	1395E+00	2690E-02	2013E-02
2089E+01	1425E+00	2117E+00	4275E-01	1301E+00	2252E-02	2119E-02
2188E+01	1342E+00	2079E+00	4499E-01	1209E+00	1829E-02	2170E-02
2291E+01	1261E+00	2037E+00	4664E-01	1121E+00	1430E-02	2168E-02
2399E+01	1183E+00	1994E+00	4776E-01	1036E+00	1059E-02	2121E-02
2512E+01	1108E+00	1949E+00	4839E-01	9540E-01	7205E-03	2034E-02
2630E+01	1036E+00	1903E+00	4858E-01	8763E-01	4184E-03	1913E-02
2754E+01	9675E-01	1855E+00	4837E-01	8027E-01	1550E-03	1766E-02
2884E+01	9023E-01	1806E+00	4781E-01	7332E-01	6858E-04	1598E-02
3020E+01	8404E-01	1756E+00	4695E-01	6679E-01	2522E-03	1417E-02
3162E+01	7817E-01	1706E+00	4583E-01	6068E-01	3966E-03	1228E-02
3311E+01	7262E-01	1655E+00	4450E-01	5500E-01	5035E-03	1039E-02
3467E+01	6738E-01	1604E+00	4300E-01	4972E-01	5757E-03	8536E-03
3631E+01	6245E-01	1553E+00	4136E-01	4485E-01	6161E-03	6768E-03
3802E+01	5781E-01	1502E+00	3962E-01	4036E-01	6286E-03	5125E-03
3981E+01	5347E-01	1452E+00	3781E-01	3625E-01	6174E-03	3636E-03
4169E+01	4940E-01	1402E+00	3595E-01	3249E-01	5865E-03	2324E-03
4365E+01	4560E-01	1353E+00	3408E-01	2906E-01	5406E-03	1202E-03
4571E+01	4206E-01	1304E+00	3220E-01	2595E-01	4837E-03	2741E-04
4786E+01	3876E-01	1257E+00	3034E-01	2313E-01	4199E-03	4603E-04
5012E+01	3569E-01	1210E+00	2852E-01	2058E-01	3529E-03	1010E-03
5248E+01	3284E-01	1164E+00	2674E-01	1828E-01	2859E-03	1389E-03
5495E+01	3020E-01	1119E+00	2502E-01	1622E-01	2217E-03	1616E-03
5754E+01	2775E-01	1076E+00	2336E-01	1437E-01	1624E-03	1712E-03
6026E+01	2549E-01	1034E+00	2177E-01	1272E-01	1096E-03	1699E-03
6310E+01	2340E-01	9924E-01	2025E-01	1124E-01	6438E-04	1602E-03
6607E+01	2146E-01	9525E-01	1881E-01	9921E-02	2728E-04	1443E-03
6918E+01	1968E-01	9139E-01	1744E-01	8748E-02	1685E-05	1245E-03
7244E+01	1804E-01	8764E-01	1615E-01	7707E-02	2285E-04	1027E-03
7586E+01	1653E-01	8402E-01	1494E-01	6784E-02	3686E-04	8044E-04
7943E+01	1514E-01	8053E-01	1380E-01	5966E-02	4463E-04	5920E-04
8318E+01	1386E-01	7716E-01	1274E-01	5243E-02	4721E-04	3999E-04
8710E+01	1269E-01	7390E-01	1174E-01	4604E-02	4572E-04	2351E-04
9120E+01	1161E-01	7077E-01	1082E-01	4040E-02	4130E-04	1016E-04
9550E+01	1062E-01	6776E-01	9956E-02	3543E-02	3504E-04	4910E-07
1000E+02	9711E-02	6486E-01	9156E-02	3105E-02	2788E-04	6964E-05
1047E+02	8879E-02	6207E-01	8414E-02	2720E-02	2062E-04	1120E-04
1096E+02	8117E-02	5939E-01	7738E-02	2382E-02	1386E-04	1310E-04
1148E+02	7418E-02	5682E-01	7093E-02	2085E-02	8012E-05	1319E-04
1202E+02	6779E-02	5435E-01	6506E-02	1824E-02	3329E-05	1197E-04
1259E+02	6193E-02	5198E-01	5966E-02	1595E-02	1121E-06	9947E-05
1318E+02	5657E-02	4971E-01	5467E-02	1394E-02	2354E-05	7566E-05
1380E+02	5167E-02	4753E-01	5009E-02	1219E-02	3542E-05	5189E-05
1445E+02	4719E-02	4544E-01	4586E-02	1065E-02	3894E-05	3054E-05
1514E+02	4309E-02	4344E-01	4199E-02	9300E-03	3648E-05	1330E-05
1585E+02	3934E-02	4152E-01	3842E-02	8121E-03	3026E-05	7431E-07
1660E+02	3592E-02	3969E-01	3515E-02	7090E-03	2238E-05	7132E-06
1738E+02	3279E-02	3793E-01	3215E-02	6189E-03	1433E-05	1095E-05
1820E+02	2993E-02	3625E-01	2939E-02	5401E-03	7336E-06	1170E-05
1905E+02	2732E-02	3464E-01	2687E-02	4713E-03	2110E-06	1030E-05
1995E+02	2493E-02	3310E-01	2456E-02	4112E-03	1362E-06	7807E-06
2089E+02	2275E-02	3163E-01	2244E-02	3586E-03	3166E-06	4962E-06
2188E+02	2076E-02	3022E-01	2051E-02	3128E-03	3611E-06	2519E-06
2291E+02	1895E-02	2887E-01	1873E-02	2728E-03	3220E-06	6790E-07
2399E+02	1729E-02	2759E-01	1711E-02	2379E-03	2356E-06	5387E-07

2512E+02	1577E-02	2636E-01	1563E-02	2074E-03	1447E-06	1073E-06
2630E+02	1439E-02	2518E-01	1427E-02	1808E-03	5740E-07	1100E-06
2754E+02	1313E-02	2405E-01	1303E-02	1576E-03	3599E-08	9011E-07
2884E+02	1198E-02	2298E-01	1189E-02	1374E-03	2639E-07	5978E-07
3020E+02	1093E-02	2195E-01	1086E-02	1197E-03	3660E-07	2751E-07
3162E+02	9970E-03	2097E-01	9911E-03	1044E-03	3585E-07	3641E-08
3311E+02	9095E-03	2003E-01	9046E-03	9095E-04	1774E-07	7629E-08
3467E+02	8297E-03	1913E-01	8256E-03	7926E-04	1652E-07	1672E-07
3631E+02	7569E-03	1827E-01	7534E-03	6907E-04	1100E-07	7265E-08
3802E+02	6904E-03	1745E-01	6875E-03	6018E-04	1629E-08	1362E-07
3981E+02	6298E-03	1667E-01	6274E-03	5244E-04	3553E-08	4072E-08
4169E+02	5744E-03	1592E-01	5725E-03	4569E-04	1853E-08	1054E-07
4365E+02	5240E-03	1521E-01	5223E-03	3981E-04	7973E-08	1965E-08
4571E+02	4779E-03	1452E-01	4766E-03	3468E-04	4203E-11	1045E-07
4786E+02	4359E-03	1387E-01	4348E-03	3022E-04	1209E-08	1674E-08
5012E+02	3976E-03	1325E-01	3967E-03	2633E-04	3278E-08	1038E-07
5248E+02	3627E-03	1265E-01	3619E-03	2293E-04	9648E-08	1885E-08
5495E+02	3308E-03	1208E-01	3301E-03	1938E-04	2629E-08	4934E-08
5754E+02	3017E-03	1154E-01	3012E-03	1740E-04	1893E-08	7346E-08
6026E+02	2752E-03	1102E-01	2747E-03	1516E-04	4499E-08	3746E-08
6310E+02	2510E-03	1053E-01	2506E-03	1321E-04	5871E-08	6631E-08
6607E+02	2288E-03	1005E-01	2286E-03	1150E-04	1210E-07	7251E-08
6918E+02	2088E-03	9602E-02	2085E-03	1002E-04	3674E-08	9738E-08
7244E+02	1904E-03	9170E-02	1902E-03	8730E-05	2099E-07	1935E-07
7586E+02	1737E-03	8758E-02	1735E-03	7604E-05	1501E-07	7938E-08
7943E+02	1584E-03	8364E-02	1583E-03	6624E-05	9851E-08	3639E-07
8318E+02	1445E-03	7988E-02	1444E-03	5769E-05	3953E-08	1061E-08
8710E+02	1318E-03	7628E-02	1317E-03	5025E-05	2925E-09	1172E-07
9120E+02	1202E-03	7285E-02	1201E-03	4377E-05	4960E-09	4781E-08
9550E+02	1096E-03	6958E-02	1095E-03	3813E-05	1831E-07	1202E-07
1000E+03	9997E-04	6645E-02	9991E-04	3321E-05	1488E-08	1840E-08
1047E+03	9118E-04	6346E-02	9113E-04	2893E-05	1180E-08	2670E-08
1096E+03	8316E-04	6060E-02	8311E-04	2520E-05	1092E-07	1102E-07
1148E+03	7584E-04	5788E-02	7581E-04	2195E-05	2919E-07	7935E-08
1202E+03	6917E-04	5527E-02	6914E-04	1911E-05	1134E-07	2729E-07
1259E+03	6308E-04	5278E-02	6306E-04	1665E-05	1121E-07	2385E-07
1318E+03	5753E-04	5041E-02	5751E-04	1450E-05	7636E-08	1611E-07
1380E+03	5247E-04	4814E-02	5246E-04	1263E-05	2759E-07	2367E-07
1445E+03	4786E-04	4598E-02	4784E-04	1100E-05	4933E-07	1606E-07
1514E+03	4365E-04	4391E-02	4363E-04	9582E-06	1897E-07	1373E-07
1585E+03	3981E-04	4193E-02	3980E-04	8346E-06	3685E-07	1743E-07
1660E+03	3630E-04	4004E-02	3630E-04	7269E-06	2233E-08	1864E-07
1738E+03	3311E-04	3824E-02	3310E-04	6331E-06	1243E-07	1237E-07
1820E+03	3020E-04	3652E-02	3019E-04	5514E-06	3600E-07	2111E-07
1905E+03	2754E-04	3488E-02	2754E-04	4803E-06	9492E-08	1885E-07
1995E+03	2512E-04	3331E-02	2511E-04	4183E-06	1199E-07	4268E-07
2089E+03	2291E-04	3181E-02	2290E-04	3643E-06	3990E-07	4323E-07
2188E+03	2089E-04	3038E-02	2089E-04	3173E-06	3557E-07	1405E-07
2291E+03	1905E-04	2901E-02	1905E-04	2764E-06	2663E-10	7021E-07
2399E+03	1738E-04	2771E-02	1738E-04	2407E-06	8146E-08	4163E-07
2512E+03	1585E-04	2646E-02	1585E-04	2097E-06	3964E-07	2025E-07
2630E+03	1445E-04	2527E-02	1445E-04	1826E-06	4502E-07	6108E-07
2754E+03	1318E-04	2413E-02	1318E-04	1591E-06	7159E-07	4810E-07
2884E+03	1202E-04	2304E-02	1202E-04	1385E-06	6144E-07	2537E-07
3020E+03	1096E-04	2201E-02	1096E-04	1207E-06	8942E-08	4030E-08
3162E+03	0000E-05	2102E-02	9999E-05	1051E-06	1431E-07	3685E-07
3311E+03	9120E-05	2007E-02	9119E-05	9153E-07	9465E-08	2158E-07
3467E+03	8317E-05	1917E-02	8317E-05	7972E-07	4391E-08	7134E-07
3631E+03	7586E-05	1831E-02	7585E-05	6943E-07	7454E-07	4973E-08
3802E+03	6918E-05	1748E-02	6918E-05	6047E-07	8287E-07	2578E-07


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3981E+03 . 6309E-05- . 1665E-02- . 6309E-05- . 5267E-07 . 3447E-07 . 2670E-07
4769E+03 . 5754E-05- . 1594E-02- . 5754E-05- . 4587E-07 . 3593E-08- . 5639E-07
4965E+03 . 5248E-05- . 1523E-02- . 5248E-05- . 3995E-07- . 2301E-08 . 6351E-07
4671E+03 . 4786E-05- . 1454E-02- . 4786E-05- . 3480E-07 . 3532E-09- . 1034E-06
4786E+03 . 4365E-05- . 1389E-02- . 4365E-05- . 3031E-07- . 3999E-07 . 3969E-07
5012E+03 . 3981E-05- . 1326E-02- . 3981E-05- . 2640E-07 . 9372E-07 . 4093E-07
5248E+03 . 3631E-05- . 1266E-02- . 3631E-05- . 2299E-07 . 1559E-06 . 4881E-07
5495E+03 . 3311E-05- . 1209E-02- . 3311E-05- . 2002E-07 . 2657E-07 . 7489E-07
5754E+03 . 3020E-05- . 1155E-02- . 3020E-05- . 1744E-07 . 9785E-07 . 9080E-07
6026E+03 . 2754E-05- . 1103E-02- . 2754E-05- . 1519E-07- . 1540E-07 . 1388E-06
6310E+03 . 2512E-05- . 1053E-02- . 2512E-05- . 1323E-07- . 8004E-07 . 3601E-07
6607E+03 . 2291E-05- . 1006E-02- . 2291E-05- . 1152E-07 . 2843E-07- . 4836E-07
6918E+03 . 2089E-05- . 9607E-03- . 2089E-05- . 1004E-07 . 2549E-07 . 5808E-07
7244E+03 . 1905E-05- . 9174E-03- . 1905E-05- . 8741E-08 . 1966E-08- . 7258E-07
7586E+03 . 1738E-05- . 8761E-03- . 1738E-05- . 7613E-08- . 3255E-07 . 4331E-08
7943E+03 . 1585E-05- . 8367E-03- . 1585E-05- . 6631E-08 . 5060E-07 . 1683E-06
8318E+03 . 1445E-05- . 7991E-03- . 1445E-05- . 5775E-08- . 4125E-08- . 9069E-07
8710E+03 . 1318E-05- . 7631E-03- . 1318E-05- . 5030E-08- . 4140E-07- . 3172E-07
9120E+03 . 1202E-05- . 7287E-03- . 1202E-05- . 4381E-08 . 3347E-07 . 3913E-08
9550E+03 . 1096E-05- . 6959E-03- . 1096E-05- . 3816E-08 . 1786E-06 . 1205E-06
1000E+041 0000E-06- . 6646E-03-1. 000E-06- . 3323E-08 . 1682E-06- . 8532E-07

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ALPHA IS 10.00. SCATTERING INDEX IS -1

BETA	RN1	IN1	RN2	IN2	RN3	IN3
1000E+00	4999E-01	4438E-03	4999E-02	8875E-04	2227E-08	2536E-09
1047E+00	4999E-01	4648E-03	4998E-02	9293E-04	2226E-08	2655E-09
1096E+00	4999E-01	4866E-03	4998E-02	9731E-04	2224E-08	2779E-09
1148E+00	4999E-01	5096E-03	4998E-02	1019E-03	2222E-08	2908E-09
1202E+00	4999E-01	5336E-03	4998E-02	1067E-03	2220E-08	3045E-09
1259E+00	4999E-01	5587E-03	4998E-02	1117E-03	2218E-08	3187E-09
1318E+00	4999E-01	5850E-03	4997E-02	1170E-03	2215E-08	3335E-09
1380E+00	4999E-01	6126E-03	4997E-02	1225E-03	2213E-08	3490E-09
1445E+00	4999E-01	6414E-03	4997E-02	1282E-03	2210E-08	3653E-09
1514E+00	4999E-01	6716E-03	4997E-02	1343E-03	2206E-08	3821E-09
1585E+00	4999E-01	7033E-03	4996E-02	1406E-03	2202E-08	3999E-09
1660E+00	4999E-01	7364E-03	4996E-02	1472E-03	2198E-08	4184E-09
1738E+00	4998E-01	7710E-03	4995E-02	1541E-03	2194E-08	4377E-09
1820E+00	4998E-01	8073E-03	4995E-02	1614E-03	2189E-08	4579E-09
1905E+00	4998E-01	8453E-03	4995E-02	1690E-03	2184E-08	4789E-09
1995E+00	4998E-01	8851E-03	4994E-02	1769E-03	2178E-08	5009E-09
2089E+00	4998E-01	9268E-03	4993E-02	1852E-03	2172E-08	5239E-09
2188E+00	4998E-01	9704E-03	4993E-02	1939E-03	2165E-08	5477E-09
2291E+00	4997E-01	1016E-02	4992E-02	2030E-03	2157E-08	5727E-09
2399E+00	4997E-01	1064E-02	4991E-02	2126E-03	2148E-08	5985E-09
2512E+00	4997E-01	1114E-02	4991E-02	2225E-03	2140E-08	6256E-09
2630E+00	4997E-01	1166E-02	4990E-02	2330E-03	2129E-08	6537E-09
2754E+00	4996E-01	1221E-02	4989E-02	2439E-03	2119E-08	6829E-09
2884E+00	4996E-01	1278E-02	4988E-02	2553E-03	2107E-08	7133E-09
3020E+00	4995E-01	1338E-02	4986E-02	2673E-03	2094E-08	7451E-09
3162E+00	4995E-01	1401E-02	4985E-02	2798E-03	2080E-08	7777E-09
3311E+00	4995E-01	1467E-02	4984E-02	2929E-03	2064E-08	8116E-09
3467E+00	4994E-01	1536E-02	4982E-02	3066E-03	2048E-08	8469E-09
3631E+00	4993E-01	1608E-02	4980E-02	3209E-03	2028E-08	8831E-09
3802E+00	4993E-01	1683E-02	4978E-02	3359E-03	2008E-08	9207E-09
3981E+00	4992E-01	1762E-02	4976E-02	3515E-03	1986E-08	9595E-09
4169E+00	4991E-01	1845E-02	4974E-02	3679E-03	1963E-08	9995E-09
4365E+00	4991E-01	1931E-02	4972E-02	3850E-03	1936E-08	1040E-08
4571E+00	4990E-01	2022E-02	4969E-02	4029E-03	1908E-08	1083E-08
4786E+00	4989E-01	2116E-02	4966E-02	4216E-03	1878E-08	1126E-08
5012E+00	4988E-01	2215E-02	4963E-02	4411E-03	1845E-08	1170E-08
5248E+00	4986E-01	2319E-02	4959E-02	4616E-03	1808E-08	1215E-08
5495E+00	4985E-01	2427E-02	4955E-02	4829E-03	1769E-08	1261E-08
5754E+00	4984E-01	2540E-02	4951E-02	5051E-03	1726E-08	1307E-08
6026E+00	4982E-01	2658E-02	4947E-02	5284E-03	1680E-08	1354E-08
6310E+00	4980E-01	2782E-02	4942E-02	5526E-03	1631E-08	1401E-08
6607E+00	4978E-01	2911E-02	4936E-02	5779E-03	1578E-08	1448E-08
6918E+00	4976E-01	3046E-02	4930E-02	6043E-03	1520E-08	1495E-08
7244E+00	4974E-01	3187E-02	4923E-02	6319E-03	1459E-08	1541E-08
7586E+00	4972E-01	3335E-02	4916E-02	6606E-03	1392E-08	1586E-08
7943E+00	4969E-01	3489E-02	4908E-02	6904E-03	1322E-08	1630E-08
8318E+00	4966E-01	3649E-02	4900E-02	7216E-03	1246E-08	1672E-08
8710E+00	4963E-01	3817E-02	4891E-02	7540E-03	1166E-08	1712E-08
9120E+00	4960E-01	3992E-02	4881E-02	7877E-03	1081E-08	1749E-08
9550E+00	4956E-01	4175E-02	4870E-02	8227E-03	9906E-09	1782E-08
1000E+01	4952E-01	4366E-02	4858E-02	8592E-03	8957E-09	1812E-08
1047E+01	4947E-01	4564E-02	4845E-02	8970E-03	7957E-09	1837E-08
1096E+01	4942E-01	4771E-02	4830E-02	9363E-03	6915E-09	1856E-08
1148E+01	4937E-01	4987E-02	4815E-02	9770E-03	5827E-09	1869E-08
1202E+01	4931E-01	5212E-02	4798E-02	1019E-02	4704E-09	1876E-08
1259E+01	4925E-01	5446E-02	4780E-02	1063E-02	3546E-09	1875E-08
1318E+01	4918E-01	5689E-02	4761E-02	1108E-02	2358E-09	1866E-08
1380E+01	4910E-01	5943E-02	4739E-02	1155E-02	1155E-09	1848E-08
1445E+01	4902E-01	6206E-02	4716E-02	1203E-02	5808E-11	1820E-08
1514E+01	4893E-01	6479E-02	4692E-02	1253E-02	1276E-09	1783E-08

1585E+01	4883E-01	6763E-02	4665E-02	1304E-02	2480E-09	1735E-08
1660E+01	4873E-01	7057E-02	4636E-02	1357E-02	3660E-09	1677E-08
1738E+01	4861E-01	7363E-02	4605E-02	1411E-02	4804E-09	1609E-08
1820E+01	4849E-01	7679E-02	4571E-02	1467E-02	5898E-09	1530E-08
1905E+01	4836E-01	8006E-02	4535E-02	1524E-02	6933E-09	1440E-08
1995E+01	4821E-01	8345E-02	4496E-02	1582E-02	7884E-09	1341E-08
2089E+01	4806E-01	8695E-02	4454E-02	1642E-02	8749E-09	1233E-08
2188E+01	4789E-01	9056E-02	4410E-02	1702E-02	9508E-09	1116E-08
2291E+01	4771E-01	9429E-02	4362E-02	1764E-02	1016E-08	9943E-09
2399E+01	4751E-01	9812E-02	4311E-02	1827E-02	1068E-08	8659E-09
2512E+01	4730E-01	1021E-01	4256E-02	1890E-02	1108E-08	7331E-09
2630E+01	4708E-01	1061E-01	4197E-02	1954E-02	1134E-08	5978E-09
2754E+01	4683E-01	1103E-01	4135E-02	2019E-02	1146E-08	4609E-09
2884E+01	4657E-01	1146E-01	4069E-02	2084E-02	1143E-08	3243E-09
3020E+01	4629E-01	1189E-01	3998E-02	2149E-02	1126E-08	1895E-09
3162E+01	4599E-01	1234E-01	3928E-02	2213E-02	1095E-08	5825E-10
3311E+01	4567E-01	1280E-01	3844E-02	2277E-02	1048E-08	6847E-10
3467E+01	4532E-01	1326E-01	3761E-02	2340E-02	9874E-09	1878E-09
3631E+01	4496E-01	1373E-01	3672E-02	2402E-02	9125E-09	2975E-09
3802E+01	4456E-01	1421E-01	3579E-02	2463E-02	8242E-09	3963E-09
3981E+01	4415E-01	1469E-01	3482E-02	2521E-02	7236E-09	4811E-09
4169E+01	4371E-01	1518E-01	3380E-02	2578E-02	6132E-09	5486E-09
4365E+01	4324E-01	1566E-01	3273E-02	2631E-02	4961E-09	5982E-09
4571E+01	4274E-01	1616E-01	3161E-02	2682E-02	3751E-09	6272E-09
4786E+01	4221E-01	1665E-01	3045E-02	2729E-02	2540E-09	6361E-09
5011E+01	4165E-01	1714E-01	2925E-02	2772E-02	1375E-09	6240E-09
5248E+01	4107E-01	1762E-01	2801E-02	2811E-02	2899E-10	5930E-09
5495E+01	4045E-01	1810E-01	2673E-02	2844E-02	6692E-10	5457E-09
5754E+01	3980E-01	1857E-01	2542E-02	2873E-02	1495E-09	4856E-09
6026E+01	3913E-01	1904E-01	2407E-02	2896E-02	2153E-09	4148E-09
6310E+01	3842E-01	1949E-01	2270E-02	2913E-02	2654E-09	3380E-09
6607E+01	3768E-01	1992E-01	2131E-02	2924E-02	2973E-09	2579E-09
6918E+01	3691E-01	2034E-01	1990E-02	2928E-02	3131E-09	1775E-09
7244E+01	3611E-01	2074E-01	1848E-02	2925E-02	3126E-09	1000E-09
7586E+01	3529E-01	2113E-01	1705E-02	2915E-02	2960E-09	2861E-10
7943E+01	3443E-01	2148E-01	1562E-02	2898E-02	2666E-09	3446E-10
8318E+01	3355E-01	2182E-01	1420E-02	2874E-02	2256E-09	8381E-10
8710E+01	3265E-01	2212E-01	1280E-02	2842E-02	1784E-09	1199E-09
9120E+01	3173E-01	2239E-01	1141E-02	2803E-02	1286E-09	1409E-09
9550E+01	3078E-01	2264E-01	1005E-02	2757E-02	7929E-10	1484E-09
1000E+02	2982E-01	2285E-01	8722E-03	2704E-02	3526E-10	1442E-09
1047E+02	2884E-01	2302E-01	7435E-03	2645E-02	3063E-11	1303E-09
1096E+02	2785E-01	2316E-01	6193E-03	2579E-02	3266E-10	1089E-09
1148E+02	2685E-01	2327E-01	5003E-03	2507E-02	5838E-10	8314E-10
1202E+02	2584E-01	2333E-01	3870E-03	2430E-02	6460E-10	5591E-10
1259E+02	2482E-01	2335E-01	2798E-03	2347E-02	6700E-10	2935E-10
1318E+02	2381E-01	2334E-01	1792E-03	2261E-02	6171E-10	6824E-11
1380E+02	2280E-01	2329E-01	8554E-04	2171E-02	5135E-10	1084E-10
1445E+02	2179E-01	2319E-01	9559E-04	2077E-02	3893E-10	2167E-10
1514E+02	2079E-01	2306E-01	8007E-04	1982E-02	2401E-10	2813E-10
1585E+02	1980E-01	2290E-01	1517E-03	1884E-02	1018E-10	2851E-10
1660E+02	1883E-01	2269E-01	2158E-03	1786E-02	9841E-12	2503E-10
1738E+02	1787E-01	2245E-01	2724E-03	1687E-02	7027E-11	1911E-10
1820E+02	1693E-01	2218E-01	3216E-03	1588E-02	1188E-10	1243E-10
1905E+02	1601E-01	2187E-01	3637E-03	1491E-02	1240E-10	5983E-11
1995E+02	1512E-01	2154E-01	3989E-03	1395E-02	1091E-10	3874E-12
2089E+02	1425E-01	2117E-01	4275E-03	1301E-02	8344E-11	2858E-11
2188E+02	1342E-01	2079E-01	4499E-03	1209E-02	5004E-11	4948E-11
2291E+02	1261E-01	2037E-01	4664E-03	1121E-02	1942E-11	4519E-11
2399E+02	1183E-01	1994E-01	4776E-03	1036E-02	4185E-12	4640E-11

2512E+02 . 1108E-01- . 1949E-01- . 4839E-03- . 9540E-03- . 2012E-11- . 2182E-11
 2330E+02 . 1036E-01- . 1903E-01- . 4858E-03- . 8763E-03- . 2386E-11- . 1712E-11
 2754E+02 . 9675E-02- . 1855E-01- . 4837E-03- . 8027E-03- . 1521E-11 . 3888E-12
 2884E+02 . 9023E-02- . 1804E-01- . 4781E-03- . 7332E-03- . 9175E-12 . 4724E-12
 3020E+02 . 8404E-02- . 1754E-01- . 4695E-03- . 6679E-03- . 2115E-12 . 2069E-12
 3162E+02 . 7817E-02- . 1704E-01- . 4583E-03- . 6068E-03 . 1140E-12 . 2519E-12
 3311E+02 . 7262E-02- . 1655E-01- . 4450E-03- . 5500E-03 . 1800E-11 . 1881E-12
 3467E+02 . 6738E-02- . 1604E-01- . 4300E-03- . 4972E-03 . 1061E-12 . 7172E-12
 3631E+02 . 6245E-02- . 1553E-01- . 4134E-03- . 4485E-03- . 3674E-12 . 8733E-12
 3802E+02 . 5781E-02- . 1502E-01- . 3962E-03- . 4036E-03 . 1233E-11- . 1237E-11
 3981E+02 . 5347E-02- . 1452E-01- . 3781E-03- . 3625E-03- . 3312E-13 . 1468E-12
 4169E+02 . 4940E-02- . 1402E-01- . 3595E-03- . 3249E-03- . 7005E-12 . 5474E-12
 4365E+02 . 4560E-02- . 1353E-01- . 3408E-03- . 2906E-03 . 4750E-12- . 8030E-12
 4571E+02 . 4204E-02- . 1304E-01- . 3220E-03- . 2595E-03- . 3568E-12 . 9336E-12
 4786E+02 . 3876E-02- . 1257E-01- . 3034E-03- . 2313E-03 . 1031E-11 . 1026E-11
 5012E+02 . 3569E-02- . 1210E-01- . 2852E-03- . 2058E-03- . 6220E-12 . 1125E-11
 5243E+02 . 3284E-02- . 1164E-01- . 2674E-03- . 1828E-03 . 9545E-12 . 1636E-12
 5495E+02 . 3020E-02- . 1119E-01- . 2502E-03- . 1622E-03 . 1267E-11 . 2036E-12
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 6026E+02 . 2549E-02- . 1034E-01- . 2177E-03- . 1272E-03 . 8730E-12- . 1420E-11
 6310E+02 . 2340E-02- . 9924E-02- . 2025E-03- . 1124E-03- . 8017E-12 . 1185E-11
 6607E+02 . 2146E-02- . 9525E-02- . 1881E-03- . 9921E-04- . 6619E-12- . 1158E-11
 6918E+02 . 1968E-02- . 9139E-02- . 1744E-03- . 8748E-04 . 1296E-12- . 6232E-12
 7244E+02 . 1804E-02- . 8764E-02- . 1615E-03- . 7707E-04 . 1834E-11- . 9322E-12
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 7943E+02 . 1514E-02- . 8053E-02- . 1380E-03- . 5966E-04 . 3795E-12- . 1939E-11
 8318E+02 . 1386E-02- . 7716E-02- . 1274E-03- . 5243E-04 . 1933E-12- . 2349E-11
 8710E+02 . 1269E-02- . 7390E-02- . 1174E-03- . 4604E-04- . 4947E-12 . 8558E-12
 9120E+02 . 1161E-02- . 7077E-02- . 1082E-03- . 4040E-04- . 3937E-11- . 3673E-12
 9550E+02 . 1062E-02- . 6776E-02- . 9956E-04- . 3543E-04- . 1888E-11- . 2337E-11
 1000E+03 . 9711E-03- . 6486E-02- . 9156E-04- . 3105E-04 . 8426E-12 . 3685E-12
 1047E+03 . 8879E-03- . 6207E-02- . 8414E-04- . 2720E-04 . 7923E-12- . 7617E-12
 1096E+03 . 8117E-03- . 5939E-02- . 7728E-04- . 2382E-04- . 2956E-12- . 1794E-12
 1148E+03 . 7418E-03- . 5681E-02- . 7099E-04- . 2085E-04- . 1250E-11- . 1957E-11
 1202E+03 . 6779E-03- . 5435E-02- . 6506E-04- . 1824E-04 . 6424E-12 . 2694E-11
 1259E+03 . 6198E-03- . 5198E-02- . 5966E-04- . 1595E-04 . 4429E-12 . 2112E-11
 1318E+03 . 5657E-03- . 4971E-02- . 5467E-04- . 1394E-04- . 1499E-11 . 9665E-12
 1380E+03 . 5167E-03- . 4753E-02- . 5009E-04- . 1219E-04- . 2197E-12 . 5068E-12
 1445E+03 . 4719E-03- . 4544E-02- . 4586E-04- . 1065E-04 . 9787E-12 . 1901E-11
 1514E+03 . 4309E-03- . 4344E-02- . 4199E-04- . 9300E-05 . 8387E-12- . 1337E-11
 1585E+03 . 3934E-03- . 4152E-02- . 3842E-04- . 8121E-05- . 2034E-11- . 1026E-11
 1660E+03 . 3592E-03- . 3969E-02- . 3515E-04- . 7090E-05 . 3296E-11- . 1220E-11
 1738E+03 . 3279E-03- . 3793E-02- . 3215E-04- . 6189E-05 . 3502E-11- . 2033E-11
 1820E+03 . 2993E-03- . 3625E-02- . 2939E-04- . 5401E-05- . 3066E-11 . 2053E-11
 1905E+03 . 2732E-03- . 3464E-02- . 2687E-04- . 4713E-05 . 5852E-11- . 9476E-12
 1995E+03 . 2493E-03- . 3310E-02- . 2456E-04- . 4112E-05 . 2228E-11 . 3311E-11
 2089E+03 . 2275E-03- . 3163E-02- . 2244E-04- . 3586E-05 . 3210E-11- . 2563E-11
 2188E+03 . 2076E-03- . 3022E-02- . 2051E-04- . 3128E-05- . 7260E-11- . 7108E-11
 2291E+03 . 1895E-03- . 2887E-02- . 1873E-04- . 2728E-05- . 4609E-11 . 1016E-11
 2399E+03 . 1729E-03- . 2759E-02- . 1711E-04- . 2379E-05- . 3914E-11 . 7724E-12
 2512E+03 . 1577E-03- . 2636E-02- . 1563E-04- . 2074E-05- . 1296E-13 . 7410E-11
 2630E+03 . 1439E-03- . 2518E-02- . 1427E-04- . 1808E-05- . 5310E-11 . 2100E-11
 2754E+03 . 1313E-03- . 2405E-02- . 1303E-04- . 1576E-05 . 6845E-11- . 2966E-11
 2884E+03 . 1198E-03- . 2298E-02- . 1189E-04- . 1374E-05 . 5881E-11- . 4348E-12
 3020E+03 . 1093E-03- . 2195E-02- . 1086E-04- . 1197E-05 . 1285E-12 . 5313E-12
 3162E+03 . 9970E-04- . 2097E-02- . 9911E-05- . 1044E-05- . 4163E-11- . 1088E-10
 3311E+03 . 9095E-04- . 2003E-02- . 9046E-05- . 9095E-06- . 2957E-11 . 3488E-11
 3467E+03 . 8297E-04- . 1913E-02- . 8256E-05- . 7926E-06- . 2478E-12- . 1231E-10
 3631E+03 . 7569E-04- . 1827E-02- . 7534E-05- . 6907E-06- . 1022E-11 . 2746E-11
 3802E+03 . 6904E-04- . 1745E-02- . 6875E-05- . 6018E-06 . 1241E-10- . 1658E-11

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3981E+03 . 6298E-04 . 1667E-02 . 6274E-05 . 5244E-06 . 7274E-12 . 8346E-11
4169E+03 . 5744E-04 . 1592E-02 . 5725E-05 . 4569E-06 . 8260E-11 . 6204E-12
4365E+03 . 5240E-04 . 1521E-02 . 5223E-05 . 3981E-06 . 1030E-10 . 3923E-11
4571E+03 . 4779E-04 . 1452E-02 . 4766E-05 . 3468E-06 . 1054E-10 . 1172E-10
4786E+03 . 4359E-04 . 1387E-02 . 4348E-05 . 3022E-06 . 8652E-11 . 7852E-11
5012E+03 . 3976E-04 . 1325E-02 . 3967E-05 . 2633E-06 . 1656E-10 . 5224E-11
5248E+03 . 3627E-04 . 1265E-02 . 3619E-05 . 2293E-06 . 1492E-10 . 9807E-11
5495E+03 . 3308E-04 . 1208E-02 . 3301E-05 . 1998E-06 . 2182E-10 . 1507E-10
5754E+03 . 3017E-04 . 1154E-02 . 3012E-05 . 1740E-06 . 8922E-11 . 5724E-11
6026E+03 . 2752E-04 . 1102E-02 . 2747E-05 . 1516E-06 . 9345E-11 . 1875E-10
6310E+03 . 2510E-04 . 1053E-02 . 2506E-05 . 1321E-06 . 9241E-11 . 1407E-12
6607E+03 . 2289E-04 . 1005E-02 . 2286E-05 . 1150E-06 . 1162E-11 . 3107E-11
6918E+03 . 2088E-04 . 9602E-03 . 2085E-05 . 1002E-06 . 9302E-11 . 1140E-11
7244E+03 . 1904E-04 . 9170E-03 . 1902E-05 . 8730E-07 . 7691E-11 . 5826E-11
7586E+03 . 1737E-04 . 8758E-03 . 1735E-05 . 7604E-07 . 1987E-10 . 1188E-10
7947E+03 . 1584E-04 . 8364E-03 . 1583E-05 . 6624E-07 . 1280E-10 . 3049E-10
8318E+03 . 1445E-04 . 7988E-03 . 1444E-05 . 5769E-07 . 1329E-11 . 1476E-10
8710E+03 . 1318E-04 . 7628E-03 . 1317E-05 . 5025E-07 . 3256E-11 . 1675E-10
9120E+03 . 1202E-04 . 7285E-03 . 1201E-05 . 4377E-07 . 8354E-11 . 1853E-10
9550E+03 . 1096E-04 . 6958E-03 . 1095E-05 . 3813E-07 . 3636E-11 . 1744E-10
1000E+04 . 9997E-05 . 6645E-03 . 9991E-06 . 3321E-07 . 1622E-10 . 2993E-10

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ALPHA IS 100.0 SCATTERING INDEX IS -1

BETA	RN1	IN1	RN2	IN2	RN3	IN3
1000E+00	5000E-02	4439E-05	5000E-04	8878E-07	0000E+00	0000E+00
1047E+00	5000E-02	4648E-05	5000E-04	9297E-07	0000E+00	0000E+00
1096E+00	5000E-02	4867E-05	5000E-04	9735E-07	0000E+00	0000E+00
1148E+00	5000E-02	5097E-05	5000E-04	1019E-06	0000E+00	0000E+00
1202E+00	5000E-02	5337E-05	5000E-04	1067E-06	0000E+00	0000E+00
1259E+00	5000E-02	5589E-05	5000E-04	1118E-06	0000E+00	0000E+00
1318E+00	5000E-02	5852E-05	5000E-04	1170E-06	0000E+00	0000E+00
1380E+00	5000E-02	6128E-05	5000E-04	1226E-06	0000E+00	0000E+00
1445E+00	5000E-02	6417E-05	5000E-04	1283E-06	0000E+00	0000E+00
1514E+00	5000E-02	6719E-05	5000E-04	1344E-06	0000E+00	0000E+00
1585E+00	5000E-02	7036E-05	5000E-04	1407E-06	0000E+00	0000E+00
1660E+00	5000E-02	7367E-05	5000E-04	1473E-06	0000E+00	0000E+00
1738E+00	5000E-02	7714E-05	5000E-04	1543E-06	0000E+00	0000E+00
1820E+00	5000E-02	8078E-05	5000E-04	1616E-06	0000E+00	0000E+00
1905E+00	5000E-02	8459E-05	5000E-04	1692E-06	0000E+00	0000E+00
1995E+00	5000E-02	8857E-05	5000E-04	1771E-06	0000E+00	0000E+00
2089E+00	5000E-02	9275E-05	5000E-04	1855E-06	0000E+00	0000E+00
2188E+00	5000E-02	9712E-05	5000E-04	1942E-06	0000E+00	0000E+00
2291E+00	5000E-02	1017E-04	5000E-04	2034E-06	0000E+00	0000E+00
2399E+00	5000E-02	1065E-04	5000E-04	2130E-06	0000E+00	0000E+00
2512E+00	5000E-02	1115E-04	5000E-04	2230E-06	0000E+00	0000E+00
2630E+00	5000E-02	1168E-04	5000E-04	2335E-06	0000E+00	0000E+00
2754E+00	5000E-02	1233E-04	5000E-04	2445E-06	0000E+00	0000E+00
2984E+00	5000E-02	1280E-04	5000E-04	2560E-06	0000E+00	0000E+00
3020E+00	5000E-02	1341E-04	5000E-04	2681E-06	0000E+00	0000E+00
3162E+00	5000E-02	1404E-04	5000E-04	2807E-06	0000E+00	0000E+00
3311E+00	5000E-02	1470E-04	5000E-04	2946E-06	0000E+00	0000E+00
3467E+00	5000E-02	1539E-04	5000E-04	3078E-06	0000E+00	0000E+00
3631E+00	5000E-02	1612E-04	5000E-04	3223E-06	0000E+00	0000E+00
3802E+00	5000E-02	1688E-04	5000E-04	3375E-06	0000E+00	0000E+00
3981E+00	5000E-02	1767E-04	5000E-04	3534E-06	0000E+00	0000E+00
4169E+00	5000E-02	1851E-04	5000E-04	3701E-06	0000E+00	0000E+00
4365E+00	5000E-02	1938E-04	5000E-04	3875E-06	0000E+00	0000E+00
4571E+00	5000E-02	2029E-04	5000E-04	4058E-06	0000E+00	0000E+00
4786E+00	5000E-02	2125E-04	5000E-04	4249E-06	0000E+00	0000E+00
5012E+00	5000E-02	2225E-04	5000E-04	4449E-06	0000E+00	0000E+00
5248E+00	5000E-02	2330E-04	5000E-04	4659E-06	0000E+00	0000E+00
5495E+00	5000E-02	2439E-04	5000E-04	4879E-06	0000E+00	0000E+00
5754E+00	5000E-02	2554E-04	5000E-04	5108E-06	0000E+00	0000E+00
6026E+00	5000E-02	2675E-04	4999E-04	5349E-06	0000E+00	0000E+00
6310E+00	5000E-02	2801E-04	4999E-04	5601E-06	0000E+00	0000E+00
6607E+00	5000E-02	2933E-04	4999E-04	5865E-06	0000E+00	0000E+00
6918E+00	5000E-02	3071E-04	4999E-04	6141E-06	0000E+00	0000E+00
7244E+00	5000E-02	3216E-04	4999E-04	6431E-06	0000E+00	0000E+00
7586E+00	5000E-02	3367E-04	4999E-04	6734E-06	0000E+00	0000E+00
7943E+00	5000E-02	3526E-04	4999E-04	7051E-06	0000E+00	0000E+00
8318E+00	5000E-02	3692E-04	4999E-04	7383E-06	0000E+00	0000E+00
8710E+00	5000E-02	3866E-04	4999E-04	7731E-06	0000E+00	0000E+00
9120E+00	5000E-02	4048E-04	4999E-04	8095E-06	0000E+00	0000E+00
9550E+00	5000E-02	4239E-04	4999E-04	8476E-06	0000E+00	0000E+00
1000E+01	5000E-02	4438E-04	4999E-04	8875E-06	0000E+00	0000E+00
1047E+01	4999E-02	4648E-04	4998E-04	9293E-06	0000E+00	0000E+00
1096E+01	4999E-02	4866E-04	4998E-04	9731E-06	0000E+00	0000E+00
1148E+01	4999E-02	5096E-04	4998E-04	1019E-05	0000E+00	0000E+00
1202E+01	4999E-02	5336E-04	4998E-04	1067E-05	0000E+00	0000E+00
1259E+01	4999E-02	5587E-04	4998E-04	1117E-05	0000E+00	0000E+00
1318E+01	4999E-02	5850E-04	4997E-04	1170E-05	0000E+00	0000E+00
1380E+01	4999E-02	6126E-04	4997E-04	1225E-05	0000E+00	0000E+00
1445E+01	4999E-02	6414E-04	4997E-04	1282E-05	0000E+00	0000E+00
1514E+01	4999E-02	6716E-04	4997E-04	1343E-05	0000E+00	0000E+00

1585E+01	4999E-02	7033E-04	4996E-04	1406E-05	0000E+00	0000E+00
1660E+01	4999E-02	7364E-04	4996E-04	1472E-05	0000E+00	0000E+00
1738E+01	4998E-02	7710E-04	4995E-04	1541E-05	0000E+00	0000E+00
1820E+01	4998E-02	8073E-04	4995E-04	1614E-05	0000E+00	0000E+00
1905E+01	4998E-02	8453E-04	4995E-04	1690E-05	0000E+00	0000E+00
1995E+01	4998E-02	8851E-04	4994E-04	1769E-05	0000E+00	0000E+00
2089E+01	4998E-02	9268E-04	4993E-04	1852E-05	0000E+00	0000E+00
2188E+01	4998E-02	9704E-04	4993E-04	1939E-05	0000E+00	0000E+00
2291E+01	4997E-02	1016E-03	4992E-04	2030E-05	0000E+00	0000E+00
2399E+01	4997E-02	1064E-03	4991E-04	2126E-05	0000E+00	0000E+00
2512E+01	4997E-02	1114E-03	4991E-04	2225E-05	0000E+00	0000E+00
2630E+01	4997E-02	1166E-03	4990E-04	2330E-05	0000E+00	0000E+00
2754E+01	4996E-02	1221E-03	4989E-04	2439E-05	0000E+00	0000E+00
2884E+01	4996E-02	1278E-03	4988E-04	2553E-05	0000E+00	0000E+00
3020E+01	4995E-02	1338E-03	4986E-04	2673E-05	0000E+00	0000E+00
3162E+01	4995E-02	1401E-03	4985E-04	2798E-05	0000E+00	0000E+00
3311E+01	4995E-02	1467E-03	4984E-04	2929E-05	0000E+00	0000E+00
3467E+01	4994E-02	1536E-03	4982E-04	3066E-05	0000E+00	0000E+00
3631E+01	4993E-02	1608E-03	4980E-04	3209E-05	0000E+00	0000E+00
3802E+01	4993E-02	1683E-03	4978E-04	3359E-05	0000E+00	0000E+00
3981E+01	4992E-02	1762E-03	4976E-04	3515E-05	0000E+00	0000E+00
4169E+01	4991E-02	1845E-03	4974E-04	3679E-05	0000E+00	0000E+00
4365E+01	4991E-02	1931E-03	4972E-04	3850E-05	0000E+00	0000E+00
4571E+01	4990E-02	2022E-03	4969E-04	4029E-05	0000E+00	0000E+00
4786E+01	4989E-02	2116E-03	4966E-04	4216E-05	0000E+00	0000E+00
5012E+01	4988E-02	2215E-03	4963E-04	4411E-05	0000E+00	0000E+00
5248E+01	4986E-02	2319E-03	4959E-04	4616E-05	0000E+00	0000E+00
5495E+01	4985E-02	2427E-03	4955E-04	4829E-05	0000E+00	0000E+00
5754E+01	4984E-02	2540E-03	4951E-04	5051E-05	0000E+00	0000E+00
6026E+01	4982E-02	2658E-03	4947E-04	5284E-05	0000E+00	0000E+00
6310E+01	4980E-02	2782E-03	4942E-04	5526E-05	0000E+00	0000E+00
6607E+01	4978E-02	2911E-03	4936E-04	5779E-05	0000E+00	0000E+00
6918E+01	4976E-02	3046E-03	4930E-04	6043E-05	0000E+00	0000E+00
7244E+01	4974E-02	3187E-03	4923E-04	6319E-05	0000E+00	0000E+00
7586E+01	4972E-02	3335E-03	4916E-04	6606E-05	0000E+00	0000E+00
7943E+01	4969E-02	3489E-03	4908E-04	6904E-05	0000E+00	0000E+00
8318E+01	4966E-02	3649E-03	4900E-04	7216E-05	0000E+00	0000E+00
8710E+01	4963E-02	3817E-03	4891E-04	7540E-05	0000E+00	0000E+00
9120E+01	4960E-02	3992E-03	4881E-04	7877E-05	0000E+00	0000E+00
9550E+01	4956E-02	4175E-03	4870E-04	8227E-05	0000E+00	0000E+00
1000E+02	4952E-02	4366E-03	4858E-04	8592E-05	0000E+00	0000E+00
1047E+02	4947E-02	4564E-03	4845E-04	8970E-05	0000E+00	0000E+00
1096E+02	4942E-02	4771E-03	4830E-04	9363E-05	0000E+00	0000E+00
1148E+02	4937E-02	4987E-03	4815E-04	9770E-05	0000E+00	0000E+00
1203E+02	4931E-02	5212E-03	4798E-04	1019E-04	0000E+00	0000E+00
1259E+02	4925E-02	5446E-03	4780E-04	1063E-04	0000E+00	0000E+00
1318E+02	4918E-02	5689E-03	4761E-04	1108E-04	0000E+00	0000E+00
1380E+02	4910E-02	5943E-03	4739E-04	1155E-04	0000E+00	0000E+00
1445E+02	4902E-02	6206E-03	4716E-04	1203E-04	0000E+00	0000E+00
1514E+02	4893E-02	6479E-03	4692E-04	1253E-04	0000E+00	0000E+00
1585E+02	4883E-02	6763E-03	4665E-04	1304E-04	0000E+00	0000E+00
1660E+02	4873E-02	7057E-03	4636E-04	1357E-04	0000E+00	0000E+00
1738E+02	4861E-02	7363E-03	4605E-04	1411E-04	0000E+00	0000E+00
1820E+02	4849E-02	7679E-03	4571E-04	1467E-04	0000E+00	0000E+00
1905E+02	4836E-02	8006E-03	4535E-04	1524E-04	0000E+00	0000E+00
1995E+02	4821E-02	8345E-03	4496E-04	1582E-04	0000E+00	0000E+00
2089E+02	4806E-02	8695E-03	4454E-04	1642E-04	0000E+00	0000E+00
2188E+02	4789E-02	9056E-03	4410E-04	1702E-04	0000E+00	0000E+00
2291E+02	4771E-02	9429E-03	4362E-04	1764E-04	0000E+00	0000E+00
2399E+02	4751E-02	9812E-03	4311E-04	1827E-04	0000E+00	0000E+00

2512E+02	4730E-02	1021E-02	4256E-04	1890E-04	0000E+00	0000E+00
2630E+02	4708E-02	1061E-02	4197E-04	1954E-04	0000E+00	0000E+00
2754E+02	4683E-02	1103E-02	4135E-04	2019E-04	0000E+00	0000E+00
2884E+02	4657E-02	1146E-02	4069E-04	2084E-04	0000E+00	0000E+00
3020E+02	4629E-02	1189E-02	3998E-04	2149E-04	0000E+00	0000E+00
3162E+02	4599E-02	1234E-02	3923E-04	2213E-04	0000E+00	0000E+00
3311E+02	4567E-02	1280E-02	3844E-04	2277E-04	0000E+00	0000E+00
3467E+02	4532E-02	1326E-02	3761E-04	2340E-04	0000E+00	0000E+00
3631E+02	4496E-02	1373E-02	3672E-04	2402E-04	0000E+00	0000E+00
3802E+02	4456E-02	1421E-02	3579E-04	2463E-04	0000E+00	0000E+00
3981E+02	4415E-02	1469E-02	3482E-04	2521E-04	0000E+00	0000E+00
4169E+02	4371E-02	1518E-02	3380E-04	2578E-04	0000E+00	0000E+00
4365E+02	4324E-02	1566E-02	3273E-04	2631E-04	0000E+00	0000E+00
4571E+02	4274E-02	1616E-02	3161E-04	2682E-04	0000E+00	0000E+00
4788E+02	4221E-02	1665E-02	3045E-04	2729E-04	0000E+00	0000E+00
5012E+02	4165E-02	1714E-02	2925E-04	2773E-04	0000E+00	0000E+00
5248E+02	4107E-02	1762E-02	2801E-04	2811E-04	0000E+00	0000E+00
5495E+02	4045E-02	1810E-02	2673E-04	2844E-04	0000E+00	0000E+00
5754E+02	3980E-02	1857E-02	2542E-04	2873E-04	0000E+00	0000E+00
6026E+02	3913E-02	1904E-02	2407E-04	2896E-04	0000E+00	0000E+00
6310E+02	3842E-02	1949E-02	2270E-04	2913E-04	0000E+00	0000E+00
6607E+02	3768E-02	1992E-02	2131E-04	2924E-04	0000E+00	0000E+00
6918E+02	3691E-02	2034E-02	1990E-04	2928E-04	0000E+00	0000E+00
7244E+02	3611E-02	2074E-02	1848E-04	2925E-04	0000E+00	0000E+00
7586E+02	3529E-02	2113E-02	1705E-04	2915E-04	0000E+00	0000E+00
7943E+02	3443E-02	2148E-02	1562E-04	2898E-04	0000E+00	0000E+00
8318E+02	3355E-02	2181E-02	1420E-04	2874E-04	0000E+00	0000E+00
8710E+02	3265E-02	2212E-02	1280E-04	2842E-04	0000E+00	0000E+00
9130E+02	3173E-02	2239E-02	1141E-04	2803E-04	0000E+00	0000E+00
9569E+02	3078E-02	2264E-02	1005E-04	2757E-04	0000E+00	0000E+00
1003E+03	2982E-02	2285E-02	8721E-05	2704E-04	0000E+00	0000E+00
1047E+03	2884E-02	2302E-02	7405E-05	2645E-04	0000E+00	0000E+00
1098E+03	2785E-02	2316E-02	6193E-05	2579E-04	0000E+00	0000E+00
1148E+03	2685E-02	2327E-02	5003E-05	2507E-04	0000E+00	0000E+00
1202E+03	2584E-02	2333E-02	3870E-05	2430E-04	0000E+00	0000E+00
1259E+03	2482E-02	2335E-02	2798E-05	2347E-04	0000E+00	0000E+00
1318E+03	2381E-02	2334E-02	1792E-05	2261E-04	0000E+00	0000E+00
1379E+03	2280E-02	2329E-02	8953E-06	2171E-04	0000E+00	0000E+00
1442E+03	2178E-02	2319E-02	7561E-06	2077E-04	0000E+00	0000E+00
1507E+03	2075E-02	2306E-02	6076E-06	1982E-04	0000E+00	0000E+00
1575E+03	1980E-02	2290E-02	4617E-06	1884E-04	0000E+00	0000E+00
1646E+03	1893E-02	2268E-02	3198E-06	1786E-04	0000E+00	0000E+00
1720E+03	1787E-02	2245E-02	2734E-06	1687E-04	0000E+00	0000E+00
1798E+03	1683E-02	2218E-02	2116E-06	1588E-04	0000E+00	0000E+00
1879E+03	1601E-02	2187E-02	1697E-06	1491E-04	0000E+00	0000E+00
1964E+03	1512E-02	2154E-02	1388E-06	1395E-04	0000E+00	0000E+00
2053E+03	1425E-02	2117E-02	1075E-06	1301E-04	0000E+00	0000E+00
2146E+03	1342E-02	2079E-02	8499E-07	1209E-04	0000E+00	0000E+00
2243E+03	1261E-02	2037E-02	6644E-07	1121E-04	0000E+00	0000E+00
2345E+03	1183E-02	1994E-02	4776E-07	1036E-04	0000E+00	0000E+00
2451E+03	1108E-02	1949E-02	3899E-07	9546E-05	0000E+00	0000E+00
2562E+03	1036E-02	1903E-02	3058E-07	8763E-05	0000E+00	0000E+00
2678E+03	9675E-03	1855E-02	2337E-07	8027E-05	0000E+00	0000E+00
2800E+03	9023E-03	1806E-02	1781E-07	7332E-05	0000E+00	0000E+00
2928E+03	8404E-03	1756E-02	1395E-07	6679E-05	0000E+00	0000E+00
3063E+03	7817E-03	1704E-02	1088E-07	6068E-05	0000E+00	0000E+00
3205E+03	7262E-03	1655E-02	8450E-08	5500E-05	0000E+00	0000E+00
3355E+03	6738E-03	1604E-02	6300E-08	4972E-05	0000E+00	0000E+00
3513E+03	6245E-03	1553E-02	4136E-08	4485E-05	0000E+00	0000E+00
3679E+03	5781E-03	1502E-02	2962E-08	4036E-05	0000E+00	0000E+00

5981E+03	5347E-03-	1452E-02-	3781E-05-	3625E-05	0000E+00	0000E+00
4114E+03	4940E-03-	1402E-02-	3595E-05-	3249E-05	0000E+00	0000E+00
4165E+03	4560E-03-	1353E-02-	3408E-05-	2906E-05	0000E+00	0000E+00
4371E+03	4206E-03-	1304E-02-	3220E-05-	2595E-05	0000E+00	0000E+00
4574E+03	3876E-03-	1257E-02-	3034E-05-	2313E-05	0000E+00	0000E+00
5012E+03	3569E-03-	1210E-02-	2852E-05-	2058E-05	0000E+00	0000E+00
5248E+03	3284E-03-	1164E-02-	2674E-05-	1828E-05	0000E+00	0000E+00
5187E+03	3020E-03-	1119E-02-	2502E-05-	1622E-05	0000E+00	0000E+00
5294E+03	2775E-03-	1076E-02-	2336E-05-	1437E-05	0000E+00	0000E+00
6026E+03	2549E-03-	1034E-02-	2177E-05-	1272E-05	0000E+00	0000E+00
6300E+03	2340E-03-	9924E-03-	2025E-05-	1124E-05	0000E+00	0000E+00
6607E+03	2146E-03-	9525E-03-	1881E-05-	9921E-06	0000E+00	0000E+00
6913E+03	1968E-03-	9139E-03-	1744E-05-	8748E-06	0000E+00	0000E+00
7249E+03	1804E-03-	8764E-03-	1615E-05-	7707E-06	0000E+00	0000E+00
7564E+03	1653E-03-	8402E-03-	1494E-05-	6764E-06	0000E+00	0000E+00
7837E+03	1514E-03-	8053E-03-	1380E-05-	5966E-06	0000E+00	0000E+00
8035E+03	1386E-03-	7716E-03-	1274E-05-	5243E-06	0000E+00	0000E+00
8110E+03	1269E-03-	7390E-03-	1174E-05-	4604E-06	0000E+00	0000E+00
8130E+03	1161E-03-	7077E-03-	1082E-05-	4040E-06	0000E+00	0000E+00
8550E+03	1062E-03-	6776E-03-	9950E-06-	3543E-06	0000E+00	0000E+00
1000E+04	9711E-04-	6486E-03-	9156E-06-	3105E-06	0000E+00	0000E+00

ALPHA IS 1.000. SCATTERING INDEX IS 0

BETA	RN1	IN1	RN2	IN2	RN3	IN3
1000E+00	6580E+00-	6580E-01	9705E+00-	1961E+00	6919E-01-	2164E-01
1047E+00	6574E+00-	6884E-01	9677E+00-	2049E+00	6881E-01-	2260E-01
1096E+00	6567E+00-	7201E-01	9646E+00-	2141E+00	6839E-01-	2360E-01
1148E+00	6560E+00-	7532E-01	9613E+00-	2237E+00	6793E-01-	2463E-01
1202E+00	6552E+00-	7877E-01	9577E+00-	2336E+00	6743E-01-	2569E-01
1259E+00	6543E+00-	8237E-01	9537E+00-	2440E+00	6688E-01-	2680E-01
1318E+00	6533E+00-	8612E-01	9493E+00-	2547E+00	6629E-01-	2794E-01
1380E+00	6522E+00-	9003E-01	9446E+00-	2658E+00	6564E-01-	2912E-01
1445E+00	6510E+00-	9410E-01	9394E+00-	2774E+00	6494E-01-	3033E-01
1514E+00	6497E+00-	9834E-01	9338E+00-	2893E+00	6417E-01-	3158E-01
1585E+00	6483E+00-	1028E+00	9277E+00-	3016E+00	6334E-01-	3286E-01
1660E+00	6468E+00-	1073E+00	9210E+00-	3144E+00	6243E-01-	3417E-01
1738E+00	6451E+00-	1121E+00	9138E+00-	3275E+00	6145E-01-	3552E-01
1820E+00	6433E+00-	1171E+00	9059E+00-	3410E+00	6038E-01-	3688E-01
1905E+00	6413E+00-	1222E+00	8973E+00-	3549E+00	5923E-01-	3828E-01
1995E+00	6392E+00-	1275E+00	8881E+00-	3691E+00	5798E-01-	3969E-01
2088E+00	6368E+00-	1331E+00	8780E+00-	3836E+00	5664E-01-	4108E-01
2188E+00	6343E+00-	1388E+00	8671E+00-	3985E+00	5519E-01-	4251E-01
2291E+00	6315E+00-	1447E+00	8554E+00-	4136E+00	5362E-01-	4394E-01
2399E+00	6285E+00-	1508E+00	8427E+00-	4290E+00	5194E-01-	4537E-01
2512E+00	6252E+00-	1570E+00	8290E+00-	4445E+00	5013E-01-	4678E-01
2630E+00	6216E+00-	1635E+00	8143E+00-	4602E+00	4820E-01-	4817E-01
2754E+00	6178E+00-	1701E+00	7984E+00-	4759E+00	4614E-01-	4952E-01
2884E+00	6136E+00-	1770E+00	7814E+00-	4916E+00	4393E-01-	5083E-01
3020E+00	6091E+00-	1839E+00	7632E+00-	5072E+00	4159E-01-	5207E-01
3162E+00	6042E+00-	1911E+00	7438E+00-	5227E+00	3911E-01-	5323E-01
3311E+00	5990E+00-	1983E+00	7231E+00-	5378E+00	3649E-01-	5426E-01
3467E+00	5933E+00-	2057E+00	7011E+00-	5526E+00	3373E-01-	5522E-01
3631E+00	5872E+00-	2132E+00	6777E+00-	5669E+00	3083E-01-	5605E-01
3802E+00	5807E+00-	2208E+00	6530E+00-	5805E+00	2780E-01-	5674E-01
3981E+00	5737E+00-	2284E+00	6270E+00-	5933E+00	2465E-01-	5726E-01
4169E+00	5662E+00-	2360E+00	5997E+00-	6051E+00	2139E-01-	5755E-01
4365E+00	5583E+00-	2437E+00	5711E+00-	6159E+00	1803E-01-	5768E-01
4571E+00	5498E+00-	2513E+00	5413E+00-	6255E+00	1459E-01-	5759E-01
4786E+00	5407E+00-	2588E+00	5103E+00-	6337E+00	1109E-01-	5725E-01
5012E+00	5312E+00-	2662E+00	4783E+00-	6403E+00	7560E-02-	5662E-01
5248E+00	5211E+00-	2735E+00	4454E+00-	6452E+00	4018E-02-	5575E-01
5495E+00	5105E+00-	2805E+00	4118E+00-	6484E+00	4995E-03-	5458E-01
5754E+00	4993E+00-	2873E+00	3775E+00-	6495E+00-	2966E-02-	5314E-01
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7244E+00	4359E+00-	3158E+00	2044E+00-	6232E+00-	1820E-01-	4172E-01
7586E+00	4219E+00-	3200E+00	1711E+00-	6113E+00-	2057E-01-	3870E-01
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8318E+00	3928E+00-	3268E+00	1077E+00-	5812E+00-	2438E-01-	3214E-01
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1000E+01	3323E+00-	3323E+00	0000E+00-	5000E+00-	2777E-01-	1812E-01
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1202E+01	2718E+00-	3268E+00-	7449E-01-	4021E+00-	2554E-01-	5359E-02
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1445E+01	2151E+00-	3110E+00-	1141E+00-	3029E+00-	1928E-01-	3703E-02
1514E+01	2020E+00-	3057E+00-	1192E+00-	2795E+00-	1738E-01-	5238E-02

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1660E+01	1770E+00	2938E+00	1245E+00	2355E+00	1349E-01	7424E-02
1738E+01	1653E+00	2873E+00	1250E+00	2151E+00	1157E-01	8096E-02
1820E+01	1542E+00	2805E+00	1243E+00	1958E+00	9712E-02	8512E-02
1905E+01	1435E+00	2735E+00	1227E+00	1777E+00	7947E-02	8694E-02
1995E+01	1334E+00	2662E+00	1202E+00	1608E+00	6297E-02	8667E-02
2089E+01	1239E+00	2588E+00	1169E+00	1452E+00	4782E-02	8461E-02
2188E+01	1149E+00	2513E+00	1131E+00	1307E+00	3414E-02	8103E-02
2291E+01	1064E+00	2437E+00	1088E+00	1174E+00	2203E-02	7622E-02
2399E+01	9840E-01	2360E+00	1042E+00	1052E+00	1153E-02	7046E-02
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3020E+01	6567E-01	1983E+00	7929E-01	5897E-01	1816E-02	3623E-02
3162E+01	6042E-01	1911E+00	7438E-01	5217E-01	2018E-02	2970E-02
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3981E+01	3945E-01	1570E+00	5231E-01	2805E-01	1814E-02	5081E-03
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4571E+01	3036E-01	1388E+00	4150E-01	1907E-01	1217E-02	2266E-03
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1660E+02	2404E-02	3990E-01	3591E-02	4344E-03	4927E-05	1993E-05
1738E+02	2194E-02	3812E-01	3279E-02	3786E-03	3061E-05	2703E-05
1820E+02	2001E-02	3641E-01	2993E-02	3299E-03	1492E-05	2743E-05
1905E+02	1826E-02	3478E-01	2732E-02	2875E-03	3203E-06	2352E-05
1995E+02	1665E-02	3323E-01	2493E-02	2505E-03	4164E-06	1747E-05
2089E+02	1519E-02	3174E-01	2275E-02	2183E-03	7754E-06	1098E-05
2188E+02	1386E-02	3032E-01	2076E-02	1902E-03	8406E-06	5379E-06
2291E+02	1264E-02	2896E-01	1895E-02	1657E-03	7334E-06	1204E-06
2399E+02	1153E-02	2766E-01	1729E-02	1444E-03	5280E-06	1370E-06

2512E+02	1052E-02	2612E-01	1577E-02	1258E-03	3096E-06	2540E-06
2630E+02	9593E-03	2523E-01	1439E-02	1096E-03	1169E-06	2593E-06
2754E+02	8750E-03	2410E-01	1313E-02	9547E-04	8894E-08	2157E-06
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4571E+02	3180E-03	1453E-01	4779E-03	2092E-04	2459E-08	6611E-08
4786E+02	2900E-03	1388E-01	4359E-03	1822E-04	8574E-09	2776E-08
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5248E+02	2412E-03	1266E-01	3627E-03	1383E-04	7536E-08	9400E-08
5495E+02	2200E-03	1209E-01	3308E-03	1204E-04	7444E-08	3427E-08
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6310E+02	1669E-03	1053E-01	2510E-03	7958E-05	7878E-08	2234E-08
6607E+02	1522E-03	1006E-01	2289E-03	6932E-05	6911E-09	2605E-08
6919E+02	1388E-03	9605E-02	2088E-03	6037E-05	2384E-08	6836E-08
7244E+02	1266E-03	9173E-02	1904E-03	5259E-05	4586E-08	8415E-08
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1738E+03	2201E-04	3824E-02	3311E-04	3811E-06	1460E-07	2885E-07
1820E+03	2007E-04	3652E-02	3020E-04	3319E-06	5197E-07	2763E-07
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1995E+03	1669E-04	3331E-02	2512E-04	2518E-06	2059E-07	2843E-07
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3311E+03	6061E-05	2007E-02	9120E-05	5508E-07	3198E-07	9069E-08
3467E+03	5528E-05	1917E-02	8317E-05	4798E-07	2627E-07	2693E-08
3631E+03	5042E-05	1831E-02	7586E-05	4179E-07	3640E-08	1383E-08
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.5248E+03 .2413E-05- .1266E-02- .3631E-05- .1384E-07 .1135E-06 .2245E-06
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.5754E+03 .2007E-05- .1155E-02- .3020E-05- .1050E-07- .5464E-07- .6235E-07
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.9550E+03 .7287E-06- .6959E-03- .1096E-05- .2296E-08 .1680E-06 .9751E-07
.1000E+04 .6646E-06- .6646E-03-1.000E-06- .2000E-08 .1525E-06 .2270E-06

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ALPHA IS 10.00. SCATTERING INDEX IS 0

BETA	RN1	IN1	RN2	IN2	RN3	IN3
1000E+00	6646E-01	6646E-03	9997E-02	2000E-03	1414E-05	1069E-06
1047E+00	6646E-01	6959E-03	9997E-02	2094E-03	1414E-05	1119E-06
1096E+00	6645E-01	7287E-03	9996E-02	2192E-03	1413E-05	1172E-06
1148E+00	6645E-01	7630E-03	9996E-02	2296E-03	1413E-05	1227E-06
1202E+00	6645E-01	7989E-03	9996E-02	2404E-03	1412E-05	1284E-06
1259E+00	6645E-01	8366E-03	9995E-02	2517E-03	1412E-05	1345E-06
1318E+00	6645E-01	8760E-03	9995E-02	2636E-03	1411E-05	1408E-06
1380E+00	6645E-01	9173E-03	9994E-02	2760E-03	1410E-05	1474E-06
1445E+00	6645E-01	9605E-03	9994E-02	2890E-03	1410E-05	1543E-06
1514E+00	6645E-01	1006E-02	9993E-02	3026E-03	1409E-05	1615E-06
1585E+00	6645E-01	1053E-02	9992E-02	3168E-03	1408E-05	1691E-06
1660E+00	6644E-01	1103E-02	9992E-02	3317E-03	1407E-05	1770E-06
1738E+00	6644E-01	1155E-02	9991E-02	3474E-03	1406E-05	1853E-06
1820E+00	6644E-01	1209E-02	9990E-02	3637E-03	1404E-05	1940E-06
1905E+00	6644E-01	1266E-02	9989E-02	3808E-03	1403E-05	2030E-06
1995E+00	6644E-01	1326E-02	9988E-02	3987E-03	1402E-05	2125E-06
2089E+00	6643E-01	1388E-02	9987E-02	4175E-03	1400E-05	2225E-06
2188E+00	6643E-01	1453E-02	9986E-02	4371E-03	1398E-05	2328E-06
2291E+00	6643E-01	1522E-02	9984E-02	4577E-03	1396E-05	2437E-06
2399E+00	6642E-01	1593E-02	9983E-02	4792E-03	1394E-05	2550E-06
2512E+00	6642E-01	1668E-02	9981E-02	5017E-03	1392E-05	2668E-06
2630E+00	6642E-01	1747E-02	9979E-02	5253E-03	1389E-05	2792E-06
2754E+00	6641E-01	1829E-02	9977E-02	5500E-03	1386E-05	2922E-06
2884E+00	6641E-01	1915E-02	9975E-02	5758E-03	1383E-05	3057E-06
3020E+00	6640E-01	2005E-02	9973E-02	6029E-03	1380E-05	3198E-06
3162E+00	6640E-01	2100E-02	9970E-02	6312E-03	1376E-05	3345E-06
3311E+00	6639E-01	2198E-02	9967E-02	6608E-03	1372E-05	3499E-06
3467E+00	6638E-01	2302E-02	9964E-02	6918E-03	1367E-05	3659E-06
3631E+00	6638E-01	2410E-02	9961E-02	7242E-03	1362E-05	3827E-06
3802E+00	6637E-01	2523E-02	9957E-02	7582E-03	1357E-05	4001E-06
3981E+00	6636E-01	2642E-02	9953E-02	7937E-03	1351E-05	4183E-06
4169E+00	6635E-01	2766E-02	9948E-02	8308E-03	1345E-05	4373E-06
4365E+00	6634E-01	2896E-02	9943E-02	8697E-03	1338E-05	4570E-06
4571E+00	6632E-01	3032E-02	9938E-02	9104E-03	1330E-05	4775E-06
4786E+00	6631E-01	3174E-02	9932E-02	9529E-03	1322E-05	4989E-06
5012E+00	6630E-01	3323E-02	9925E-02	9974E-03	1312E-05	5210E-06
5248E+00	6628E-01	3478E-02	9918E-02	1044E-02	1302E-05	5441E-06
5495E+00	6626E-01	3641E-02	9910E-02	1092E-02	1291E-05	5680E-06
5754E+00	6624E-01	3812E-02	9901E-02	1143E-02	1279E-05	5927E-06
6026E+00	6622E-01	3990E-02	9892E-02	1196E-02	1266E-05	6184E-06
6310E+00	6620E-01	4177E-02	9881E-02	1252E-02	1252E-05	6449E-06
6607E+00	6617E-01	4372E-02	9870E-02	1310E-02	1236E-05	6723E-06
6918E+00	6615E-01	4576E-02	9858E-02	1371E-02	1219E-05	7006E-06
7244E+00	6612E-01	4790E-02	9844E-02	1434E-02	1201E-05	7297E-06
7586E+00	6608E-01	5013E-02	9829E-02	1500E-02	1180E-05	7596E-06
7943E+00	6605E-01	5246E-02	9813E-02	1569E-02	1158E-05	7903E-06
8318E+00	6601E-01	5490E-02	9795E-02	1641E-02	1134E-05	8217E-06
8710E+00	6596E-01	5745E-02	9775E-02	1716E-02	1108E-05	8537E-06
9120E+00	6591E-01	6011E-02	9754E-02	1794E-02	1080E-05	8863E-06
9550E+00	6586E-01	6290E-02	9731E-02	1876E-02	1049E-05	9194E-06
1000E+01	6580E-01	6580E-02	9705E-02	1961E-02	1016E-05	9529E-06
1047E+01	6574E-01	6884E-02	9677E-02	2049E-02	9800E-06	9865E-06
1096E+01	6567E-01	7201E-02	9646E-02	2141E-02	9409E-06	1020E-05
1148E+01	6560E-01	7532E-02	9613E-02	2237E-02	8988E-06	1054E-05
1202E+01	6552E-01	7877E-02	9577E-02	2336E-02	8533E-06	1087E-05
1259E+01	6543E-01	8237E-02	9537E-02	2440E-02	8044E-06	1119E-05
1318E+01	6533E-01	8612E-02	9493E-02	2547E-02	7517E-06	1151E-05
1380E+01	6522E-01	9003E-02	9446E-02	2658E-02	6953E-06	1181E-05
1445E+01	6510E-01	9410E-02	9394E-02	2774E-02	6349E-06	1209E-05
1514E+01	6497E-01	9834E-02	9338E-02	2893E-02	5704E-06	1235E-05

1585E+01	6483E-01	1028E-01	9277E-02	3016E-02	5018E-06	1259E-05
1660E+01	6468E-01	1073E-01	9210E-02	3144E-02	4290E-06	1280E-05
1738E+01	6451E-01	1121E-01	9139E-02	3275E-02	3520E-06	1296E-05
1820E+01	6433E-01	1171E-01	9059E-02	3410E-02	2709E-06	1308E-05
1905E+01	6413E-01	1222E-01	8973E-02	3549E-02	1858E-06	1315E-05
1995E+01	6392E-01	1275E-01	8881E-02	3691E-02	9707E-07	1317E-05
2089E+01	6368E-01	1331E-01	8780E-02	3836E-02	4984E-08	1311E-05
2188E+01	6343E-01	1388E-01	8671E-02	3985E-02	8994E-07	1298E-05
2291E+01	6315E-01	1447E-01	8554E-02	4136E-02	1871E-06	1277E-05
2399E+01	6285E-01	1508E-01	8427E-02	4290E-02	2857E-06	1247E-05
2512E+01	6252E-01	1570E-01	8290E-02	4445E-02	3847E-06	1207E-05
2630E+01	6216E-01	1635E-01	8143E-02	4602E-02	4831E-06	1157E-05
2754E+01	6178E-01	1701E-01	7984E-02	4759E-02	5794E-06	1096E-05
2884E+01	6136E-01	1770E-01	7814E-02	4916E-02	6721E-06	1023E-05
3020E+01	6091E-01	1839E-01	7632E-02	5072E-02	7595E-06	9380E-06
3162E+01	6042E-01	1911E-01	7438E-02	5227E-02	8397E-06	8417E-06
3311E+01	5990E-01	1983E-01	7231E-02	5378E-02	9105E-06	7341E-06
3467E+01	5933E-01	2057E-01	7011E-02	5526E-02	9699E-06	6159E-06
3631E+01	5872E-01	2132E-01	6777E-02	5669E-02	1016E-05	4882E-06
3802E+01	5807E-01	2208E-01	6530E-02	5805E-02	1045E-05	3527E-06
3981E+01	5737E-01	2284E-01	6270E-02	5933E-02	1057E-05	2116E-06
4169E+01	5662E-01	2360E-01	5997E-02	6051E-02	1049E-05	6755E-07
4365E+01	5583E-01	2437E-01	5711E-02	6159E-02	1021E-05	7622E-07
4571E+01	5498E-01	2513E-01	5413E-02	6255E-02	9701E-06	2160E-06
4786E+01	5407E-01	2588E-01	5103E-02	6337E-02	8977E-06	3477E-06
5012E+01	5312E-01	2662E-01	4783E-02	6403E-02	8043E-06	4670E-06
5248E+01	5211E-01	2735E-01	4454E-02	6452E-02	6918E-06	5696E-06
5495E+01	5105E-01	2805E-01	4118E-02	6484E-02	5628E-06	6512E-06
5754E+01	4993E-01	2873E-01	3775E-02	6495E-02	4216E-06	7081E-06
6026E+01	4876E-01	2938E-01	3428E-02	6486E-02	2730E-06	7375E-06
6310E+01	4754E-01	2999E-01	3079E-02	6456E-02	1229E-06	7375E-06
6607E+01	4627E-01	3057E-01	2731E-02	6403E-02	2220E-07	7078E-06
6918E+01	4495E-01	3110E-01	2385E-02	6329E-02	1556E-06	6497E-06
7244E+01	4359E-01	3158E-01	2044E-02	6232E-02	2707E-06	5662E-06
7586E+01	4219E-01	3200E-01	1711E-02	6113E-02	3619E-06	4621E-06
7943E+01	4075E-01	3237E-01	1387E-02	5972E-02	4248E-06	3436E-06
8318E+01	3928E-01	3268E-01	1077E-02	5812E-02	4565E-06	2184E-06
8710E+01	3779E-01	3292E-01	7806E-03	5633E-02	4567E-06	9474E-07
9120E+01	3628E-01	3309E-01	5014E-03	5436E-02	4271E-06	1933E-07
9550E+01	3476E-01	3320E-01	2407E-03	5225E-02	3720E-06	1163E-06
1000E+02	3323E-01	3323E-01	1788E-03	5000E-02	2976E-06	1905E-06
1047E+02	3170E-01	3320E-01	2195E-03	4765E-02	2116E-06	2379E-06
1096E+02	3018E-01	3309E-01	4170E-03	4522E-02	1224E-06	2575E-06
1148E+02	2867E-01	3292E-01	5923E-03	4273E-02	3841E-07	2508E-06
1202E+02	2718E-01	3268E-01	7449E-03	4021E-02	3318E-07	2218E-06
1259E+02	2571E-01	3237E-01	8754E-03	3768E-02	8709E-07	1767E-06
1318E+02	2428E-01	3200E-01	9843E-03	3517E-02	1204E-06	1225E-06
1380E+02	2288E-01	3158E-01	1073E-02	3270E-02	1329E-06	6691E-07
1445E+02	2151E-01	3110E-01	1141E-02	3029E-02	1269E-06	1649E-07
1514E+02	2020E-01	3057E-01	1192E-02	2795E-02	1066E-06	2356E-07
1585E+02	1893E-01	2999E-01	1226E-02	2570E-02	7767E-07	5022E-07
1660E+02	1770E-01	2938E-01	1245E-02	2355E-02	4581E-07	6278E-07
1738E+02	1653E-01	2873E-01	1250E-02	2151E-02	1629E-07	6275E-07
1820E+02	1542E-01	2805E-01	1243E-02	1958E-02	7109E-08	5315E-07
1905E+02	1435E-01	2735E-01	1227E-02	1777E-02	2230E-07	3797E-07
1995E+02	1334E-01	2662E-01	1202E-02	1608E-02	2890E-07	2115E-07
2089E+02	1239E-01	2588E-01	1169E-02	1452E-02	2825E-07	6097E-08
2188E+02	1149E-01	2513E-01	1131E-02	1307E-02	2257E-07	5053E-08
2291E+02	1064E-01	2437E-01	1088E-02	1174E-02	1444E-07	1131E-07
2399E+02	9840E-02	2360E-01	1042E-02	1052E-02	6294E-08	1296E-07

. 512E+02	. 9093E-02-	. 2284E-01-	. 9937E-03-	. 9403E-03-	. 1460E-09-	. 1120E-07
. 2630E+02	. 8394E-02-	. 2208E-01-	. 9439E-03-	. 8390E-03-	. 4098E-08-	. 7610E-08
. 2754E+02	. 7741E-02-	. 2132E-01-	. 8934E-03-	. 7473E-03-	. 5505E-08-	. 3626E-08
. 2884E+02	. 7133E-02-	. 2057E-01-	. 8429E-03-	. 6644E-03-	. 4997E-08-	. 3879E-09
. 3020E+02	. 6567E-02-	. 1983E-01-	. 7928E-03-	. 5897E-03-	. 3422E-08-	. 1614E-08
. 3162E+02	. 6042E-02-	. 1911E-01-	. 7438E-03-	. 5227E-03-	. 1580E-08-	. 2342E-08
. 3311E+02	. 5555E-02-	. 1839E-01-	. 6961E-03-	. 4626E-03-	. 7474E-10	. 2066E-08
. 3457E+02	. 5104E-02-	. 1770E-01-	. 6500E-03-	. 4089E-03-	. 7366E-09-	. 1284E-08
. 3631E+02	. 4686E-02-	. 1701E-01-	. 6057E-03-	. 3610E-03-	. 9519E-09-	. 4803E-09
. 3802E+02	. 4301E-02-	. 1635E-01-	. 5633E-03-	. 3184E-03-	. 7622E-09-	. 1224E-09
. 3981E+02	. 3945E-02-	. 1570E-01-	. 5231E-03-	. 2805E-03-	. 3847E-09-	. 3607E-09
. 4169E+02	. 3616E-02-	. 1508E-01-	. 4849E-03-	. 2469E-03-	. 7791E-10-	. 3475E-09
. 4365E+02	. 3314E-02-	. 1447E-01-	. 4489E-03-	. 2171E-03-	. 1105E-09-	. 1770E-09
. 4571E+02	. 3036E-02-	. 1388E-01-	. 4150E-03-	. 1907E-03-	. 1496E-09-	. 1046E-09
. 4786E+02	. 2780E-02-	. 1331E-01-	. 3833E-03-	. 1675E-03-	. 8799E-10	. 4116E-10
. 5012E+02	. 2545E-02-	. 1275E-01-	. 3535E-03-	. 1469E-03-	. 5485E-10	. 8311E-10
. 5248E+02	. 2329E-02-	. 1222E-01-	. 3258E-03-	. 1288E-03-	. 3077E-10	. 5963E-10
. 5495E+02	. 2130E-02-	. 1171E-01-	. 3000E-03-	. 1129E-03-	. 3079E-10	. 2367E-10
. 5754E+02	. 1948E-02-	. 1121E-01-	. 2760E-03-	. 9890E-04-	. 3549E-10-	. 2896E-10
. 6026E+02	. 1781E-02-	. 1073E-01-	. 2537E-03-	. 8658E-04-	. 2575E-11-	. 3990E-10
. 6310E+02	. 1629E-02-	. 1028E-01-	. 2330E-03-	. 7577E-04-	. 3067E-10-	. 3785E-11
. 6607E+02	. 1488E-02-	. 9834E-02-	. 2139E-03-	. 6628E-04-	. 8879E-11-	. 2602E-10
. 6918E+02	. 1360E-02-	. 9410E-02-	. 1963E-03-	. 5795E-04-	. 4878E-11-	. 1412E-10
. 7244E+02	. 1243E-02-	. 9003E-02-	. 1800E-03-	. 5066E-04-	. 3560E-10-	. 4593E-11
. 7586E+02	. 1135E-02-	. 8612E-02-	. 1650E-03-	. 4427E-04-	. 8216E-10-	. 1970E-10
. 7943E+02	. 1037E-02-	. 8237E-02-	. 1511E-03-	. 3867E-04-	. 3109E-10	. 1338E-10
. 8318E+02	. 9470E-03-	. 7877E-02-	. 1384E-03-	. 3377E-04	. 1533E-10	. 1928E-10
. 8710E+02	. 8648E-03-	. 7532E-02-	. 1267E-03-	. 2949E-04	. 9337E-11-	. 4735E-11
. 9120E+02	. 7896E-03-	. 7201E-02-	. 1160E-03-	. 2574E-04-	. 9445E-10-	. 3993E-11
. 9550E+02	. 7208E-03-	. 6884E-02-	. 1061E-03-	. 2247E-04	. 2422E-10-	. 9490E-11
. 1000E+03	. 6580E-03-	. 6580E-02-	. 9705E-04-	. 1961E-04	. 3806E-10	. 7509E-11
. 1047E+03	. 6007E-03-	. 6290E-02-	. 8874E-04-	. 1711E-04	. 1595E-10-	. 1773E-10
. 1096E+03	. 5483E-03-	. 6011E-02-	. 8113E-04-	. 1492E-04-	. 7548E-10-	. 1950E-10
. 1146E+03	. 5004E-03-	. 5745E-02-	. 7415E-04-	. 1302E-04	. 5569E-10-	. 2669E-10
. 1203E+03	. 4567E-03-	. 5490E-02-	. 6776E-04-	. 1135E-04-	. 1187E-09	. 1836E-10
. 1259E+03	. 4167E-03-	. 5246E-02-	. 6191E-04-	. 9898E-05	. 2262E-11-	. 3085E-10
. 1318E+03	. 3803E-03-	. 5013E-02-	. 5656E-04-	. 8631E-05-	. 5992E-10	. 1297E-10
. 1380E+03	. 3470E-03-	. 4790E-02-	. 5166E-04-	. 7525E-05-	. 2218E-10-	. 9587E-10
. 1445E+03	. 3166E-03-	. 4576E-02-	. 4718E-04-	. 6560E-05	. 9321E-11	. 2531E-10
. 1514E+03	. 2889E-03-	. 4372E-02-	. 4308E-04-	. 5718E-05-	. 7677E-12-	. 1208E-09
. 1585E+03	. 2635E-03-	. 4177E-02-	. 3934E-04-	. 4984E-05	. 1787E-09-	. 8860E-10
. 1660E+03	. 2404E-03-	. 3990E-02-	. 3591E-04-	. 4344E-05	. 1984E-09	. 3720E-10
. 1738E+03	. 2194E-03-	. 3812E-02-	. 3279E-04-	. 3786E-05-	. 5174E-10	. 3164E-10
. 1820E+03	. 2001E-03-	. 3641E-02-	. 2993E-04-	. 3299E-05-	. 6675E-10-	. 8830E-10
. 1905E+03	. 1826E-03-	. 3478E-02-	. 2732E-04-	. 2875E-05	. 6751E-10	. 5031E-11
. 1995E+03	. 1665E-03-	. 3323E-02-	. 2493E-04-	. 2505E-05-	. 5130E-10	. 1058E-09
. 2089E+03	. 1519E-03-	. 3174E-02-	. 2275E-04-	. 2183E-05-	. 3486E-10	. 1230E-09
. 2188E+03	. 1386E-03-	. 3032E-02-	. 2076E-04-	. 1902E-05-	. 1780E-09	. 1801E-09
. 2291E+03	. 1264E-03-	. 2896E-02-	. 1895E-04-	. 1657E-05	. 5911E-10-	. 2991E-10
. 2399E+03	. 1153E-03-	. 2766E-02-	. 1729E-04-	. 1444E-05	. 1476E-09	. 1365E-09
. 2512E+03	. 1052E-03-	. 2642E-02-	. 1577E-04-	. 1258E-05	. 1246E-09-	. 1228E-09
. 2630E+03	. 9593E-04-	. 2523E-02-	. 1439E-04-	. 1096E-05	. 1216E-09-	. 1101E-09
. 2754E+03	. 8750E-04-	. 2410E-02-	. 1313E-04-	. 9547E-06	. 1071E-09	. 1014E-10
. 2884E+03	. 7981E-04-	. 2302E-02-	. 1198E-04-	. 8317E-06-	. 1450E-09	. 1592E-09
. 3020E+03	. 7280E-04-	. 2198E-02-	. 1093E-04-	. 7246E-06	. 6424E-10-	. 2223E-09
. 3162E+03	. 6640E-04-	. 2100E-02-	. 9970E-05-	. 6312E-06-	. 1372E-09	. 7212E-10
. 3311E+03	. 6056E-04-	. 2005E-02-	. 9095E-05-	. 5498E-06-	. 2286E-09	. 1532E-09
. 3467E+03	. 5524E-04-	. 1915E-02-	. 8297E-05-	. 4790E-06	. 1267E-09	. 3222E-09
. 3631E+03	. 5038E-04-	. 1829E-02-	. 7569E-05-	. 4172E-06-	. 2549E-09	. 3188E-10
. 3802E+03	. 4595E-04-	. 1747E-02-	. 6904E-05-	. 3634E-06	. 4270E-09-	. 5229E-11


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.3531E+03 .4191E-04. 1668E-02. 6298E-05. 3166E-06. 3418E-09. 8244E-10
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4365E+03 .3486E-04. 1522E-02. 5240E-05. 2402E-06 .1701E-09. 1603E-09
4571E+03 .3180E-04. 1453E-02. 4779E-05. 2092E-06. 5212E-10 .5426E-10
4786E+03 .2900E-04. 1388E-02. 4359E-05. 1822E-06 .1566E-09 .3817E-09
5012E+03 .2645E-04. 1326E-02. 3976E-05. 1587E-06 .3568E-11. 4437E-09
5248E+03 .2412E-04. 1266E-02. 3627E-05. 1383E-06 .3870E-10. 1817E-09
5495E+03 .2200E-04. 1209E-02. 3308E-05. 1204E-06. 2741E-09. 7363E-10
5754E+03 .2007E-04. 1155E-02. 3017E-05. 1049E-06 .1314E-11 .1991E-09
6026E+03 .1830E-04. 1103E-02. 2752E-05. 9137E-07. 4881E-11 .1226E-09
6310E+03 .1669E-04. 1053E-02. 2510E-05. 7958E-07 .1662E-11 .5382E-09
6607E+03 .1522E-04. 1006E-02. 2289E-05. 6932E-07. 8705E-10. 9289E-10
6918E+03 .1388E-04. 9605E-03. 2088E-05. 6037E-07 .1788E-09. 3664E-09
7244E+03 .1266E-04. 9173E-03. 1904E-05. 5259E-07. 2243E-09. 1227E-09
7586E+03 .1155E-04. 8760E-03. 1737E-05. 4530E-07. 5740E-10 .1339E-09
7943E+03 .1053E-04. 8366E-03. 1584E-05. 3989E-07 .4668E-09 .1287E-09
8313E+03 .9605E-05. 7989E-03. 1445E-05. 3475E-07. 6429E-10. 5348E-09
8710E+03 .8760E-05. 7630E-03. 1318E-05. 3026E-07 .3196E-09 .9414E-10
9120E+03 .7990E-05. 7287E-03. 1202E-05. 2636E-07. 1807E-10. 2294E-09
9550E+03 .7287E-05. 6959E-03. 1096E-05. 2296E-07 .1147E-09. 2151E-09
1000E+04 .6646E-05. 6646E-03. 9997E-06. 2000E-07. 1903E-09 .5169E-09

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ALPHA	IP	100	0	SCATTERING	INDEX	IS	0
BFPA	RM1	INC	RM2	IN2	RMS	IN3	
1000E+00	6646E-02	6646E-051	0000E-04	2000E-06	3924E-21	1129E-22	
1047E+00	6646E-02	6959E-051	0000E-04	2094E-06	3859E-21	1163E-22	
1096E+00	6646E-02	7287E-051	0000E-04	2193E-06	3859E-21	1219E-22	
1148E+00	6646E-02	7631E-051	0000E-04	2296E-06	3905E-21	1292E-22	
1202E+00	6646E-02	7991E-051	0000E-04	2405E-06	3888E-21	1348E-22	
1259E+00	6646E-02	8367E-051	0000E-04	2518E-06	3860E-21	1400E-22	
1318E+00	6646E-02	8761E-051	0000E-04	2637E-06	3909E-21	1484E-22	
1380E+00	6646E-02	9174E-051	0000E-04	2761E-06	3844E-21	1529E-22	
1445E+00	6646E-02	9607E-051	0000E-04	2891E-06	3941E-21	1643E-22	
1514E+00	6646E-02	1006E-041	0000E-04	3027E-06	3893E-21	1697E-22	
1585E+00	6646E-02	1053E-041	0000E-04	3170E-06	3831E-21	1753E-22	
1660E+00	6646E-02	1103E-041	0000E-04	3319E-06	3887E-21	1862E-22	
1738E+00	6646E-02	1155E-041	0000E-04	3476E-06	3834E-21	1924E-22	
1820E+00	6646E-02	1209E-041	0000E-04	3639E-06	3895E-21	2046E-22	
1905E+00	6646E-02	1266E-041	0000E-04	3811E-06	3876E-21	2184E-22	
1995E+00	6646E-02	1326E-041	0000E-04	3990E-06	3844E-21	2227E-22	
2089E+00	6646E-02	1389E-041	0000E-04	4179E-06	3852E-21	2326E-22	
2188E+00	6646E-02	1454E-041	0000E-04	4378E-06	3911E-21	2463E-22	
2291E+00	6646E-02	1533E-041	0000E-04	4582E-06	3832E-21	2531E-22	
2399E+00	6646E-02	1594E-041	0000E-04	4798E-06	3863E-21	2668E-22	
2512E+00	6646E-02	1669E-041	0000E-04	5024E-06	3882E-21	2812E-22	
2630E+00	6646E-02	1748E-041	0000E-04	5260E-06	3858E-21	2932E-22	
2754E+00	6646E-02	1831E-041	0000E-04	5508E-06	3875E-21	3087E-22	
2884E+00	6646E-02	1917E-041	0000E-04	5768E-06	3908E-21	3251E-22	
3020E+00	6646E-02	2007E-041	0000E-04	6040E-06	3917E-21	3426E-22	
3162E+00	6646E-02	2102E-041	0000E-04	6324E-06	3800E-21	3477E-22	
3311E+00	6646E-02	2201E-041	0000E-04	6622E-06	3928E-21	3758E-22	
3467E+00	6646E-02	2304E-041	0000E-04	6935E-06	3911E-21	3908E-22	
3631E+00	6646E-02	2413E-041	0000E-04	7261E-06	3901E-21	4094E-22	
3802E+00	6646E-02	2527E-041	0000E-04	7604E-06	3844E-21	4255E-22	
3981E+00	6646E-02	2646E-041	0000E-04	7962E-06	3932E-21	4527E-22	
4169E+00	6646E-02	2771E-04	9999E-04	8337E-06	3903E-21	4708E-22	
4365E+00	6646E-02	2901E-04	9999E-04	8730E-06	3841E-21	4848E-22	
4571E+00	6646E-02	3038E-04	9999E-04	9141E-06	3870E-21	5128E-22	
4786E+00	6646E-02	3181E-04	9999E-04	9572E-06	3857E-21	5354E-22	
5012E+00	6646E-02	3331E-04	9999E-04	1002E-05	3775E-21	5480E-22	
5248E+00	6646E-02	3488E-04	9999E-04	1050E-05	3812E-21	5808E-22	
5495E+00	6646E-02	3652E-04	9999E-04	1099E-05	3900E-21	6224E-22	
5754E+00	6646E-02	3824E-04	9999E-04	1151E-05	3843E-21	6446E-22	
6026E+00	6646E-02	4005E-04	9999E-04	1205E-05	3909E-21	6846E-22	
6310E+00	6646E-02	4193E-04	9999E-04	1262E-05	3853E-21	7101E-22	
6607E+00	6646E-02	4391E-04	9999E-04	1321E-05	3793E-21	7315E-22	
6918E+00	6646E-02	4598E-04	9999E-04	1384E-05	3770E-21	7615E-22	
7244E+00	6646E-02	4815E-04	9999E-04	1449E-05	3886E-21	8214E-22	
7586E+00	6646E-02	5041E-04	9999E-04	1517E-05	3847E-21	8541E-22	
7943E+00	6646E-02	5279E-04	9999E-04	1588E-05	3780E-21	8817E-22	
8318E+00	6646E-02	5523E-04	9999E-04	1663E-05	3762E-21	9205E-22	
8710E+00	6646E-02	5783E-04	9999E-04	1742E-05	3771E-21	9681E-22	
9120E+00	6646E-02	6061E-04	9999E-04	1824E-05	3750E-21	1011E-21	
9550E+00	6646E-02	6347E-04	9997E-04	1910E-05	3741E-21	1056E-21	
1000E+01	6646E-02	6646E-04	9997E-04	2000E-05	3833E-21	1134E-21	
1047E+01	6646E-02	6959E-04	9997E-04	2094E-05	3736E-21	1163E-21	
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1148E+01	6645E-02	7630E-04	9996E-04	2296E-05	3653E-21	1254E-21	
1202E+01	6645E-02	7989E-04	9996E-04	2404E-05	3710E-21	1337E-21	
1259E+01	6645E-02	8366E-04	9995E-04	2517E-05	3616E-21	1378E-21	
1318E+01	6645E-02	8760E-04	9995E-04	2636E-05	3599E-21	1441E-21	
1380E+01	6645E-02	9173E-04	9994E-04	2760E-05	3638E-21	1530E-21	
1445E+01	6645E-02	9605E-04	9994E-04	2890E-05	3626E-21	1604E-21	
1514E+01	6645E-02	1006E-03	9993E-04	3026E-05	3584E-21	1668E-21	

1737E+01	6645E-02	1053E-03	9992E-04	3168E-05	3574E-21	1757E-21
1740E+01	6644E-02	1103E-03	9992E-04	3317E-05	3457E-21	1797E-21
1738E+01	6644E-02	1155E-03	9991E-04	3474E-05	3429E-21	1873E-21
1830E+01	6644E-02	1209E-03	9990E-04	3637E-05	3355E-21	1937E-21
1905E+01	6644E-02	1266E-03	9989E-04	3808E-05	3277E-21	2008E-21
1995E+01	6644E-02	1326E-03	9988E-04	3987E-05	3145E-21	2043E-21
2087E+01	6643E-02	1388E-03	9987E-04	4175E-05	3197E-21	2191E-21
2188E+01	6643E-02	1453E-03	9986E-04	4371E-05	3129E-21	2283E-21
2291E+01	6643E-02	1522E-03	9984E-04	4577E-05	3006E-21	2343E-21
2398E+01	6642E-02	1593E-03	9983E-04	4792E-05	3014E-21	2493E-21
2512E+01	6642E-02	1668E-03	9981E-04	5017E-05	2934E-21	2581E-21
2630E+01	6642E-02	1747E-03	9979E-04	5253E-05	2794E-21	2654E-21
2754E+01	6641E-02	1829E-03	9977E-04	5500E-05	2722E-21	2766E-21
2884E+01	6641E-02	1915E-03	9975E-04	5758E-05	2604E-21	2856E-21
3020E+01	6640E-02	2005E-03	9973E-04	6029E-05	2457E-21	2930E-21
3162E+01	6640E-02	2100E-03	9970E-04	6312E-05	2360E-21	3045E-21
3311E+01	6639E-02	2198E-03	9967E-04	6608E-05	2232E-21	3144E-21
3467E+01	6638E-02	2302E-03	9964E-04	6918E-05	2142E-21	3312E-21
3631E+01	6638E-02	2410E-03	9961E-04	7242E-05	1936E-21	3335E-21
3802E+01	6637E-02	2523E-03	9957E-04	7582E-05	1755E-21	3406E-21
3981E+01	6636E-02	2642E-03	9953E-04	7937E-05	1575E-21	3500E-21
4169E+01	6635E-02	2766E-03	9948E-04	8308E-05	1391E-21	3603E-21
4365E+01	6634E-02	2896E-03	9943E-04	8697E-05	1181E-21	3647E-21
4571E+01	6632E-02	3032E-03	9938E-04	9104E-05	9756E-22	3748E-21
4786E+01	6631E-02	3174E-03	9932E-04	9529E-05	7357E-22	3773E-21
5012E+01	6630E-02	3323E-03	9925E-04	9974E-05	4938E-22	3862E-21
5249E+01	6628E-02	3478E-03	9918E-04	1044E-04	2234E-22	3870E-21
5495E+01	6626E-02	3641E-03	9910E-04	1092E-04	4601E-23	3815E-21
5754E+01	6624E-02	3812E-03	9901E-04	1143E-04	3184E-22	3850E-21
6026E+01	6622E-02	3990E-03	9892E-04	1196E-04	6284E-22	3734E-21
6310E+01	6620E-02	4177E-03	9881E-04	1252E-04	9230E-22	3654E-21
6607E+01	6617E-02	4372E-03	9870E-04	1310E-04	1208E-21	3522E-21
6915E+01	6615E-02	4576E-03	9858E-04	1371E-04	1531E-21	3438E-21
7244E+01	6612E-02	4790E-03	9844E-04	1434E-04	1836E-21	3272E-21
7595E+01	6608E-02	5013E-03	9829E-04	1500E-04	2180E-21	3073E-21
7968E+01	6605E-02	5248E-03	9813E-04	1569E-04	2460E-21	2796E-21
8363E+01	6601E-02	5490E-03	9795E-04	1641E-04	2732E-21	2548E-21
8780E+01	6596E-02	5745E-03	9775E-04	1716E-04	3027E-21	2250E-21
9210E+01	6591E-02	6011E-03	9754E-04	1794E-04	3242E-21	1825E-21
9652E+01	6586E-02	6290E-03	9731E-04	1876E-04	3425E-21	1415E-21
10108E+02	6580E-02	6580E-03	9705E-04	1961E-04	3583E-21	9595E-22
10647E+02	6574E-02	6884E-03	9677E-04	2049E-04	3586E-21	4649E-22
11249E+02	6567E-02	7201E-03	9646E-04	2141E-04	3673E-21	5492E-23
11938E+02	6560E-02	7532E-03	9613E-04	2237E-04	3590E-21	5825E-22
12722E+02	6552E-02	7877E-03	9577E-04	2336E-04	3415E-21	1141E-21
13599E+02	6543E-02	8237E-03	9537E-04	2440E-04	3225E-21	1695E-21
1458E+02	6533E-02	8612E-03	9493E-04	2547E-04	2777E-21	2153E-21
1560E+02	6522E-02	9003E-03	9446E-04	2658E-04	2382E-21	2572E-21
1675E+02	6510E-02	9410E-03	9394E-04	2774E-04	1824E-21	3011E-21
1804E+02	6497E-02	9834E-03	9338E-04	2893E-04	1246E-21	3201E-21
1945E+02	6483E-02	1028E-02	9277E-04	3016E-04	5240E-22	3321E-21
1060E+02	6468E-02	1073E-02	9210E-04	3144E-04	1669E-22	3369E-21
1038E+02	6451E-02	1121E-02	9138E-04	3275E-04	9577E-22	3134E-21
1830E+02	6433E-02	1171E-02	9059E-04	3410E-04	1606E-21	2816E-21
1205E+02	6413E-02	1222E-02	8973E-04	3549E-04	2188E-21	2339E-21
1335E+02	6392E-02	1275E-02	8881E-04	3691E-04	2701E-21	1638E-21
2039E+02	6368E-02	1331E-02	8780E-04	3836E-04	2989E-21	8711E-22
2188E+02	6343E-02	1388E-02	8671E-04	3985E-04	3018E-21	4484E-23
2341E+02	6315E-02	1447E-02	8554E-04	4136E-04	2836E-21	8973E-22
2499E+02	6285E-02	1508E-02	8427E-04	4290E-04	2379E-21	1618E-21

2512E+02	6252E-02	1570E-02	8290E-04	4445E-04	1742E-21	2216E-21
2630E+02	6216E-02	1635E-02	8143E-04	4602E-04	8356E-22	2629E-21
2754E+02	6178E-02	1701E-02	7984E-04	4759E-04	1286E-22	2625E-21
2884E+02	6136E-02	1770E-02	7814E-04	4916E-04	1030E-21	2284E-21
3020E+02	6091E-02	1839E-02	7632E-04	5072E-04	1705E-21	1744E-21
3162E+02	6042E-02	1911E-02	7438E-04	5227E-04	2164E-21	8810E-22
3311E+02	5990E-02	1983E-02	7231E-04	5378E-04	2212E-21	7289E-23
3467E+02	5933E-02	2057E-02	7011E-04	5526E-04	1886E-21	9304E-22
3631E+02	5872E-02	2132E-02	6777E-04	5669E-04	1200E-21	1596E-21
3802E+02	5807E-02	2208E-02	6520E-04	5805E-04	3323E-22	1829E-21
3981E+02	5737E-02	2284E-02	6270E-04	5933E-04	5328E-22	1621E-21
4169E+02	5662E-02	2360E-02	5997E-04	6051E-04	1166E-21	1033E-21
4365E+02	5583E-02	2437E-02	5711E-04	6159E-04	1414E-21	2775E-22
4571E+02	5498E-02	2513E-02	5413E-04	6255E-04	1297E-21	4955E-22
4786E+02	5407E-02	2588E-02	5103E-04	6337E-04	7202E-22	1025E-21
5012E+02	5312E-02	2663E-02	4783E-04	6403E-04	1803E-23	1110E-21
5248E+02	5211E-02	2735E-02	4454E-04	6452E-04	6208E-22	7415E-22
5495E+02	5105E-02	2805E-02	4118E-04	6484E-04	8112E-22	1851E-22
5754E+02	4993E-02	2873E-02	3775E-04	6495E-04	6668E-22	3232E-22
6026E+02	4876E-02	2938E-02	3428E-04	6486E-04	2783E-22	5950E-22
6310E+02	4754E-02	2999E-02	3079E-04	6456E-04	1811E-22	5783E-22
6607E+02	4627E-02	3057E-02	2731E-04	6403E-04	4216E-22	1781E-22
6918E+02	4495E-02	3110E-02	2385E-04	6329E-04	3919E-22	1247E-22
7244E+02	4359E-02	3158E-02	2044E-04	6232E-04	1059E-22	4203E-22
7586E+02	4219E-02	3200E-02	1711E-04	6113E-04	1269E-22	2356E-22
7943E+02	4075E-02	3237E-02	1387E-04	5972E-04	2451E-22	9459E-23
8318E+02	3928E-02	3268E-02	1077E-04	5812E-04	6773E-23	1071E-22
8710E+02	3779E-02	3292E-02	7806E-05	5633E-04	5685E-23	1067E-22
9120E+02	3628E-02	3309E-02	5014E-05	5436E-04	4085E-23	2531E-23
9550E+02	3476E-02	3320E-02	2407E-05	5225E-04	7678E-23	1396E-22
1000E+03	3323E-02	3323E-02	2384E-10	5000E-04	4997E-23	5293E-23
1047E+03	3170E-02	3320E-02	2195E-05	4765E-04	8445E-23	8357E-24
1096E+03	3018E-02	3309E-02	4170E-05	4522E-04	7990E-24	1119E-23
1148E+03	2867E-02	3292E-02	5922E-05	4273E-04	9996E-23	8818E-23
1203E+03	2718E-02	3268E-02	7449E-05	4021E-04	5474E-23	6882E-23
1259E+03	2571E-02	3237E-02	8754E-05	3768E-04	6361E-23	3789E-23
1318E+03	2428E-02	3200E-02	9843E-05	3517E-04	7286E-23	2873E-24
1380E+03	2288E-02	3158E-02	1073E-04	3270E-04	3010E-23	8814E-23
1445E+03	2151E-02	3110E-02	1141E-04	3029E-04	6395E-23	5916E-23
1514E+03	2020E-02	3057E-02	1192E-04	2795E-04	1906E-23	5268E-23
1585E+03	1893E-02	2999E-02	1226E-04	2570E-04	3307E-23	1045E-22
1660E+03	1770E-02	2938E-02	1245E-04	2355E-04	6277E-23	8160E-23
1739E+03	1653E-02	2873E-02	1250E-04	2151E-04	1922E-23	8680E-24
1820E+03	1542E-02	2805E-02	1243E-04	1958E-04	5764E-24	6516E-23
1905E+03	1435E-02	2735E-02	1227E-04	1777E-04	6226E-23	1196E-22
1995E+03	1334E-02	2663E-02	1202E-04	1608E-04	2044E-23	1404E-23
2089E+03	1239E-02	2588E-02	1169E-04	1452E-04	2620E-23	6571E-23
2188E+03	1149E-02	2513E-02	1131E-04	1307E-04	2847E-23	8749E-23
2291E+03	1064E-02	2437E-02	1088E-04	1174E-04	3028E-26	1076E-22
2399E+03	9840E-03	2360E-02	1042E-04	1052E-04	1452E-22	1419E-22
2512E+03	9093E-03	2284E-02	9937E-05	9403E-05	1180E-22	2230E-23
2630E+03	8394E-03	2208E-02	9439E-05	8390E-05	3325E-23	5694E-23
2754E+03	7741E-03	2132E-02	8934E-05	7473E-05	7420E-23	5213E-23
2884E+03	7133E-03	2057E-02	8429E-05	6644E-05	4809E-23	5883E-23
3020E+03	6567E-03	1983E-02	7929E-05	5897E-05	5899E-23	5903E-23
3162E+03	6042E-03	1911E-02	7438E-05	5227E-05	1402E-22	2534E-22
3311E+03	5555E-03	1839E-02	6961E-05	4626E-05	1417E-22	3005E-23
3467E+03	5104E-03	1770E-02	6500E-05	4089E-05	6400E-23	4383E-23
3631E+03	4686E-03	1701E-02	6057E-05	3610E-05	3505E-22	1344E-22
3802E+03	4301E-03	1635E-02	5633E-05	3184E-05	7801E-23	1060E-23

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3921E+03 . 3945E-03- 1570E-02- 5231E-05- 2805E-05 . 8337E-23 . 1169E-22
4167E+03 . 3616E-03- 1508E-02- 4849E-05- 2468E-05 . 2185E-22 . 8457E-23
4365E+03 . 3314E-03- 1447E-02- 4489E-05- 2171E-05 . 5921E-23 . 8084E-23
4571E+03 . 3036E-03- 1388E-02- 4150E-05- 1907E-05 . 1661E-22 . 3209E-23
4786E+03 . 2780E-03- 1331E-02- 3833E-05- 1675E-05 . 9313E-23 . 1584E-22
5012E+03 . 2545E-03- 1275E-02- 3535E-05- 1469E-05 . 1493E-23 . 2642E-22
5248E+03 . 2329E-03- 1222E-02- 3258E-05- 1288E-05 . 8484E-23 . 6743E-23
5485E+03 . 2130E-03- 1171E-02- 3000E-05- 1129E-05 . 7392E-23 . 8001E-23
5754E+03 . 1948E-03- 1121E-02- 2760E-05- 9890E-06 . 1260E-22 . 1250E-22
6026E+03 . 1781E-03- 1073E-02- 2537E-05- 8658E-06 . 7315E-25 . 2100E-22
6310E+03 . 1629E-03- 1028E-02- 2330E-05- 7577E-06 . 1084E-22 . 9036E-24
6607E+03 . 1488E-03- 9834E-03- 2139E-05- 6628E-06 . 3165E-22 . 9899E-23
6916E+03 . 1360E-03- 9410E-03- 1963E-05- 5795E-06 . 2691E-23 . 7562E-23
7244E+03 . 1243E-03- 9003E-03- 1800E-05- 5066E-06 . 3231E-23 . 9054E-23
7584E+03 . 1135E-03- 8612E-03- 1650E-05- 4427E-06 . 1231E-22 . 2148E-22
7949E+03 . 1037E-03- 8237E-03- 1511E-05- 3867E-06 . 2328E-22 . 7639E-24
8318E+03 . 9470E-04- 7877E-03- 1384E-05- 3377E-06 . 7142E-23 . 5358E-22
8710E+03 . 8647E-04- 7532E-03- 1267E-05- 2949E-06 . 2407E-22 . 5577E-23
9120E+03 . 7896E-04- 7201E-03- 1160E-05- 2574E-06 . 1873E-22 . 1823E-22
9550E+03 . 7208E-04- 6884E-03- 1061E-05- 2247E-06 . 2083E-22 . 3410E-22
1000E+04 . 6580E-04- 6580E-03- 9705E-06- 1961E-06 . 2716E-22 . 7796E-23

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ALPHA IS	1. SCATTERING INDEX IS 1					
BETA	RN1	IN1	RN2	IN2	RN3	IN3
1000E+00	9711E+00-	1606E+00	2668E+01-	1066E+01	3322E+00-	1842E+00
1047E+00	9685E+00-	1676E+00	2638E+01-	1108E+01	3264E+00-	1910E+00
1096E+00	9656E+00-	1749E+00	2607E+01-	1150E+01	3202E+00-	1978E+00
1148E+00	9624E+00-	1825E+00	2572E+01-	1193E+01	3135E+00-	2047E+00
1202E+00	9590E+00-	1903E+00	2536E+01-	1236E+01	3063E+00-	2116E+00
1259E+00	9552E+00-	1984E+00	2496E+01-	1280E+01	2986E+00-	2185E+00
1318E+00	9512E+00-	2067E+00	2454E+01-	1323E+01	2903E+00-	2253E+00
1380E+00	9468E+00-	2153E+00	2408E+01-	1367E+01	2815E+00-	2320E+00
1445E+00	9421E+00-	2241E+00	2359E+01-	1411E+01	2721E+00-	2386E+00
1514E+00	9369E+00-	2332E+00	2308E+01-	1455E+01	2621E+00-	2450E+00
1585E+00	9314E+00-	2425E+00	2252E+01-	1498E+01	2515E+00-	2512E+00
1660E+00	9254E+00-	2521E+00	2194E+01-	1540E+01	2403E+00-	2570E+00
1738E+00	9189E+00-	2618E+00	2132E+01-	1581E+01	2285E+00-	2625E+00
1820E+00	9120E+00-	2718E+00	2066E+01-	1620E+01	2161E+00-	2676E+00
1905E+00	9045E+00-	2819E+00	1997E+01-	1658E+01	2032E+00-	2721E+00
1995E+00	8965E+00-	2922E+00	1925E+01-	1693E+01	1897E+00-	2761E+00
2089E+00	8879E+00-	3026E+00	1849E+01-	1726E+01	1756E+00-	2795E+00
2188E+00	8788E+00-	3131E+00	1770E+01-	1756E+01	1611E+00-	2821E+00
2291E+00	8690E+00-	3237E+00	1688E+01-	1783E+01	1462E+00-	2840E+00
2399E+00	8585E+00-	3343E+00	1602E+01-	1807E+01	1308E+00-	2850E+00
2512E+00	8474E+00-	3449E+00	1515E+01-	1826E+01	1152E+00-	2852E+00
2630E+00	8357E+00-	3554E+00	1425E+01-	1841E+01	9941E+01-	2843E+00
2754E+00	8232E+00-	3659E+00	1333E+01-	1852E+01	8347E+01-	2825E+00
2884E+00	8101E+00-	3762E+00	1240E+01-	1858E+01	6749E+01-	2796E+00
3020E+00	7962E+00-	3863E+00	1145E+01-	1858E+01	5160E+01-	2757E+00
3162E+00	7817E+00-	3961E+00	1050E+01-	1854E+01	3591E+01-	2706E+00
3311E+00	7664E+00-	4056E+00	9548E+00-	1844E+01	2052E+01-	2645E+00
3467E+00	7505E+00-	4148E+00	8600E+00-	1828E+01	5568E+02-	2573E+00
3631E+00	7339E+00-	4236E+00	7661E+00-	1807E+01-	8838E+02-	2491E+00
3802E+00	7167E+00-	4319E+00	6737E+00-	1781E+01-	2258E+01-	2399E+00
3981E+00	6989E+00-	4396E+00	5833E+00-	1750E+01-	3554E+01-	2297E+00
4169E+00	6805E+00-	4468E+00	4956E+00-	1713E+01-	4763E+01-	2188E+00
4365E+00	6615E+00-	4534E+00	4109E+00-	1672E+01-	5874E+01-	2070E+00
4571E+00	6421E+00-	4592E+00	3298E+00-	1626E+01-	6879E+01-	1946E+00
4786E+00	6223E+00-	4644E+00	2527E+00-	1575E+01-	7772E+01-	1817E+00
5012E+00	6020E+00-	4687E+00	1800E+00-	1522E+01-	8547E+01-	1684E+00
5248E+00	5815E+00-	4723E+00	1120E+00-	1464E+01-	9201E+01-	1547E+00
5495E+00	5606E+00-	4751E+00	4895E+01-	1405E+01-	9732E+01-	1409E+00
5754E+00	5396E+00-	4770E+00-	8947E+02-	1343E+01-	1014E+00-	1271E+00
6026E+00	5185E+00-	4781E+00-	6156E+01-	1279E+01-	1043E+00-	1135E+00
6310E+00	4974E+00-	4783E+00-	1088E+00-	1214E+01-	1059E+00-	1000E+00
6607E+00	4763E+00-	4776E+00-	1508E+00-	1148E+01-	1065E+00-	8693E+01
6918E+00	4552E+00-	4761E+00-	1875E+00-	1083E+01-	1060E+00-	7432E+01
7244E+00	4344E+00-	4737E+00-	2190E+00-	1017E+01-	1045E+00-	6227E+01
7586E+00	4137E+00-	4706E+00-	2457E+00-	9527E+00-	1020E+00-	5089E+01
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8318E+00	3734E+00-	4619E+00-	2850E+00-	8276E+00-	9489E+01-	3037E+01
8710E+00	3539E+00-	4564E+00-	2983E+00-	7677E+00-	9036E+01-	2135E+01
9120E+00	3348E+00-	4503E+00-	3077E+00-	7100E+00-	8534E+01-	1320E+01
9550E+00	3162E+00-	4435E+00-	3137E+00-	6546E+00-	7992E+01-	5912E+02
1000E+01	2982E+00-	4361E+00-	3164E+00-	6019E+00-	7423E+01-	4971E+03
1047E+01	2807E+00-	4283E+00-	3164E+00-	5518E+00-	6834E+01-	6044E+02
1096E+01	2639E+00-	4199E+00-	3139E+00-	5046E+00-	6237E+01-	1073E+01
1148E+01	2477E+00-	4111E+00-	3092E+00-	4601E+00-	5639E+01-	1463E+01
1202E+01	2321E+00-	4019E+00-	3027E+00-	4185E+00-	5048E+01-	1777E+01
1259E+01	2173E+00-	3924E+00-	2946E+00-	3798E+00-	4472E+01-	2018E+01
1318E+01	2030E+00-	3826E+00-	2853E+00-	3438E+00-	3916E+01-	2194E+01
1380E+01	1895E+00-	3726E+00-	2750E+00-	3105E+00-	3385E+01-	2310E+01
1445E+01	1767E+00-	3624E+00-	2639E+00-	2799E+00-	2884E+01-	2372E+01
1514E+01	1645E+00-	3522E+00-	2523E+00-	2517E+00-	2417E+01-	2386E+01

1585E+01	1529E+00-	3418E+00-	2404E+00-	2260E+00-	1985E-01	2358E-01
1660E+01	1421E+00-	3314E+00-	2282E+00-	2024E+00-	1590E-01	2295E-01
1738E+01	1318E+00-	3210E+00-	2160E+00-	1811E+00-	1234E-01	2202E-01
1820E+01	1222E+00-	3106E+00-	2038E+00-	1616E+00-	9161E-02	2085E-01
1905E+01	1131E+00-	3003E+00-	1919E+00-	1441E+00-	6363E-02	1950E-01
1995E+01	1046E+00-	2901E+00-	1802E+00-	1282E+00-	3935E-02	1801E-01
2089E+01	9670E-01-	2800E+00-	1688E+00-	1140E+00-	1865E-02	1643E-01
2188E+01	8929E-01-	2700E+00-	1578E+00-	1011E+00-	1327E-03	1480E-01
2291E+01	8238E-01-	2603E+00-	1473E+00-	8963E-01	1282E-02	1316E-01
2399E+01	7595E-01-	2507E+00-	1372E+00-	7935E-01	2402E-02	1154E-01
2512E+01	6997E-01-	2413E+00-	1276E+00-	7016E-01	3254E-02	9965E-02
2630E+01	6442E-01-	2322E+00-	1184E+00-	6197E-01	3865E-02	8465E-02
2754E+01	5926E-01-	2232E+00-	1098E+00-	5468E-01	4262E-02	7056E-02
2884E+01	5449E-01-	2145E+00-	1017E+00-	4820E-01	4473E-02	5752E-02
3020E+01	5007E-01-	2060E+00-	9405E-01-	4245E-01	4525E-02	4563E-02
3162E+01	4599E-01-	1978E+00-	8688E-01-	3735E-01	4444E-02	3497E-02
3311E+01	4222E-01-	1899E+00-	8018E-01-	3285E-01	4256E-02	2556E-02
3467E+01	3874E-01-	1822E+00-	7392E-01-	2886E-01	3985E-02	1742E-02
3631E+01	3553E-01-	1747E+00-	6809E-01-	2534E-01	3652E-02	1051E-02
3802E+01	3257E-01-	1675E+00-	6267E-01-	2224E-01	3278E-02	4795E-03
3981E+01	2985E-01-	1605E+00-	5764E-01-	1950E-01	2880E-02	1999E-04
4169E+01	2734E-01-	1538E+00-	5297E-01-	1709E-01	2476E-02-	3859E-03
4365E+01	2504E-01-	1473E+00-	4865E-01-	1498E-01	2077E-02-	5978E-03
4571E+01	2292E-01-	1411E+00-	4466E-01-	1311E-01	1696E-02-	7763E-03
4786E+01	2098E-01-	1351E+00-	4097E-01-	1148E-01	1340E-02-	8825E-03
5012E+01	1919E-01-	1293E+00-	3757E-01-	1004E-01	1017E-02-	9277E-03
5248E+01	1756E-01-	1237E+00-	3443E-01-	8784E-02	7319E-03-	9232E-03
5495E+01	1606E-01-	1184E+00-	3155E-01-	7680E-02	4862E-03-	8797E-03
5754E+01	1468E-01-	1133E+00-	2889E-01-	6713E-02	2811E-03-	8074E-03
6026E+01	1342E-01-	1084E+00-	2645E-01-	5866E-02	1159E-03-	7156E-03
6310E+01	1227E-01-	1036E+00-	2421E-01-	5124E-02-	1152E-04-	6127E-03
6607E+01	1121E-01-	9911E-01-	2215E-01-	4475E-02-	1041E-03-	5057E-03
6918E+01	1024E-01-	9477E-01-	2026E-01-	3908E-02-	1658E-03-	4006E-03
7244E+01	9356E-02-	9061E-01-	1853E-01-	3411E-02-	2010E-03-	3021E-03
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7943E+01	7805E-02-	8281E-01-	1548E-01-	2598E-02-	2107E-03-	1373E-03
8318E+01	7127E-02-	7915E-01-	1415E-01-	2267E-02-	1944E-03-	7448E-04
8710E+01	6508E-02-	7565E-01-	1293E-01-	1978E-02-	1698E-03-	2538E-04
9120E+01	5942E-02-	7230E-01-	1181E-01-	1725E-02-	1406E-03	1071E-04
9550E+01	5424E-02-	6909E-01-	1079E-01-	1504E-02-	1100E-03	3482E-04
1000E+02	4952E-02-	6603E-01-	9852E-02-	1312E-02-	8046E-04	4865E-04
1047E+02	4520E-02-	6309E-01-	8997E-02-	1144E-02-	5380E-04	5408E-04
1096E+02	4125E-02-	6028E-01-	8215E-02-	9974E-03-	3123E-04	5312E-04
1148E+02	3765E-02-	5760E-01-	7501E-02-	8695E-03-	1334E-04	4771E-04
1202E+02	3436E-02-	5503E-01-	6847E-02-	7580E-03-	2490E-06	3965E-04
1259E+02	3135E-02-	5257E-01-	6250E-02-	6607E-03	8366E-05	3046E-04
1318E+02	2861E-02-	5023E-01-	5705E-02-	5758E-03	1309E-04	2134E-04
1380E+02	2611E-02-	4798E-01-	5207E-02-	5019E-03	1472E-04	1316E-04
1445E+02	2382E-02-	4584E-01-	4752E-02-	4374E-03	1408E-04	6455E-05
1514E+02	2173E-02-	4378E-01-	4337E-02-	3812E-03	1200E-04	1464E-05
1585E+02	1983E-02-	4182E-01-	3957E-02-	3321E-03	9195E-05-	1830E-05
1660E+02	1809E-02-	3995E-01-	3611E-02-	2894E-03	6271E-05-	3620E-05
1738E+02	1650E-02-	3816E-01-	3295E-02-	2522E-03	3619E-05-	4207E-05
1820E+02	1505E-02-	3645E-01-	3006E-02-	2197E-03	1503E-05-	3957E-05
1905E+02	1373E-02-	3482E-01-	2743E-02-	1914E-03	1228E-07-	3207E-05
1995E+02	1253E-02-	3325E-01-	2502E-02-	1668E-03-	8586E-06-	2252E-05
2089E+02	1143E-02-	3176E-01-	2283E-02-	1453E-03-	1223E-05-	1330E-05
2188E+02	1042E-02-	3034E-01-	2083E-02-	1266E-03-	1213E-05-	5626E-06
2291E+02	9509E-03-	2898E-01-	1900E-02-	1103E-03-	9923E-06-	3036E-07
2399E+02	8674E-03-	2767E-01-	1733E-02-	9607E-04-	6668E-06-	2733E-06

2512E+02	7912E-03-	2643E-01-	1581E-02-	8367E-04-	3547E-06	3786E-06
2630E+02	7217E-03-	2524E-01-	1442E-02-	7291E-04-	1119E-06	3585E-06
2754E+02	6583E-03-	2411E-01-	1316E-02-	6351E-04	4127E-07	2688E-06
2884E+02	6004E-03-	2303E-01-	1200E-02-	5532E-04	1079E-06	1555E-06
3020E+02	5476E-03-	2199E-01-	1095E-02-	4819E-04	1136E-06	7047E-07
3162E+02	4995E-03-	2100E-01-	9985E-03-	4198E-04	9811E-07	3723E-08
3311E+02	4556E-03-	2006E-01-	9108E-03-	3657E-04	6622E-07-	3134E-07
3467E+02	4155E-03-	1916E-01-	8307E-03-	3185E-04	2941E-07-	4121E-07
3631E+02	3790E-03-	1830E-01-	7577E-03-	2774E-04	8004E-08-	2364E-07
3802E+02	3457E-03-	1747E-01-	6911E-03-	2417E-04-	1044E-07-	2283E-07
3981E+02	3153E-03-	1669E-01-	6304E-03-	2105E-04-	1169E-07-	1951E-07
4169E+02	2876E-03-	1594E-01-	5749E-03-	1833E-04-	1361E-07	3574E-08
4365E+02	2623E-03-	1522E-01-	5244E-03-	1597E-04-	1713E-08	4457E-08
4571E+02	2392E-03-	1454E-01-	4783E-03-	1391E-04	7483E-09-	4958E-08
4786E+02	2182E-03-	1388E-01-	4362E-03-	1212E-04	4038E-08-	8489E-08
5012E+02	1990E-03-	1326E-01-	3979E-03-	1055E-04	3005E-08	1320E-07
5243E+02	1815E-03-	1266E-01-	3629E-03-	9192E-05-	9496E-08	7328E-08
5495E+02	1655E-03-	1209E-01-	3310E-03-	8006E-05	8673E-08	1834E-07
5754E+02	1510E-03-	1155E-01-	3019E-03-	6973E-05	1302E-07-	2745E-08
6026E+02	1377E-03-	1103E-01-	2753E-03-	6074E-05	2926E-08-	2483E-09
6310E+02	1256E-03-	1053E-01-	2511E-03-	5290E-05-	6013E-08-	1156E-07
6607E+02	1145E-03-	1006E-01-	2290E-03-	4608E-05-	1227E-07	9983E-08
6918E+02	1044E-03-	9605E-02-	2089E-03-	4013E-05	2622E-07	7660E-08
7244E+02	9525E-04-	9173E-02-	1905E-03-	3495E-05	8182E-08-	3193E-07
7586E+02	8687E-04-	8760E-02-	1737E-03-	3044E-05-	7465E-08-	1954E-07
7943E+02	7923E-04-	8366E-02-	1585E-03-	2652E-05-	1649E-08-	1342E-07
8318E+02	7226E-04-	7990E-02-	1445E-03-	2310E-05	4456E-08	2367E-07
8710E+02	6590E-04-	7630E-02-	1318E-03-	2012E-05	8454E-08	3016E-08
9120E+02	6011E-04-	7287E-02-	1202E-03-	1752E-05-	1831E-07	1017E-07
9550E+02	5482E-04-	6959E-02-	1096E-03-	1526E-05	1104E-08-	2422E-09
1000E+03	4999E-04-	6646E-02-	9998E-04-	1329E-05-	4065E-07	1389E-07
1047E+03	4560E-04-	6347E-02-	9119E-04-	1158E-05	1688E-07-	2909E-07
1096E+03	4158E-04-	6061E-02-	8317E-04-	1008E-05-	1338E-07-	4274E-09
1148E+03	3793E-04-	5788E-02-	7585E-04-	8781E-06	2662E-08	5417E-08
1202E+03	3459E-04-	5528E-02-	6918E-04-	7648E-06	2464E-07	6116E-09
1259E+03	3155E-04-	5279E-02-	6309E-04-	6662E-06-	1073E-07-	1090E-08
1318E+03	2877E-04-	5042E-02-	5754E-04-	5802E-06	3671E-09	3386E-07
1380E+03	2624E-04-	4815E-02-	5248E-04-	5053E-06-	1547E-07-	2674E-07
1445E+03	2393E-04-	4598E-02-	4786E-04-	4401E-06-	3984E-07	1058E-07
1514E+03	2182E-04-	4391E-02-	4365E-04-	3833E-06-	2575E-07	5552E-08
1586E+03	1990E-04-	4193E-02-	3981E-04-	3339E-06-	5722E-08	7079E-08
1660E+03	1815E-04-	4005E-02-	3631E-04-	2908E-06-	4369E-08-	3889E-07
1738E+03	1656E-04-	3824E-02-	3311E-04-	2533E-06-	1497E-07	1427E-07
1820E+03	1510E-04-	3652E-02-	3020E-04-	2206E-06-	3613E-07	5778E-08
1905E+03	1377E-04-	3488E-02-	2754E-04-	1921E-06-	1541E-07-	1014E-07
1995E+03	1256E-04-	3331E-02-	2512E-04-	1673E-06	8469E-08	6750E-07
2089E+03	1145E-04-	3181E-02-	2291E-04-	1457E-06	6269E-07	2868E-07
2188E+03	1045E-04-	3038E-02-	2089E-04-	1269E-06	3698E-07-	3465E-07
2291E+03	9527E-05-	2901E-02-	1905E-04-	1106E-06-	1988E-07	3712E-07
2399E+03	8689E-05-	2771E-02-	1738E-04-	9629E-07-	4594E-07-	2063E-07
2512E+03	7924E-05-	2646E-02-	1585E-04-	8387E-07	8521E-07	5622E-07
2630E+03	7227E-05-	2527E-02-	1445E-04-	7305E-07	2619E-07-	7700E-07
2754E+03	6591E-05-	2413E-02-	1318E-04-	6362E-07	4463E-07-	7235E-08
2884E+03	6011E-05-	2304E-02-	1202E-04-	5541E-07-	2335E-07-	8111E-08
3020E+03	5482E-05-	2201E-02-	1096E-04-	4826E-07	1619E-07-	9727E-07
3162E+03	5000E-05-	2102E-02-1	1000E-05-	4203E-07-	5820E-07	2428E-07
3311E+03	4560E-05-	2007E-02-	9120E-05-	3661E-07	3564E-07-	1796E-07
3467E+03	4159E-05-	1917E-02-	8318E-05-	3189E-07	5321E-07	1113E-06
3631E+03	3793E-05-	1831E-02-	7586E-05-	2777E-07-	1652E-07	5708E-08
3802E+03	3459E-05-	1748E-02-	6918E-05-	2419E-07	1266E-06	5980E-07


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3981E+03 . 3155E-05- 1669E-02- 6310E-05- 2107E-07 . 9221E-08- 2697E-08
4169E+03 . 2877E-05- 1594E-02- 5754E-05- 1835E-07- 1453E-07- 5237E-07
4365E+03 . 2624E-05- 1523E-02- 5248E-05- 1598E-07- 1832E-07 . 2048E-07
4571E+03 . 2393E-05- 1454E-02- 4786E-05- 1392E-07 . 1554E-06- 5113E-07
4786E+03 . 2183E-05- 1389E-02- 4365E-05- 1212E-07- 7156E-07- 4970E-07
5012E+03 . 1991E-05- 1326E-02- 3981E-05- 1056E-07- 9289E-07 . 9344E-07
5248E+03 . 1815E-05- 1266E-02- 3631E-05- 9196E-08 . 5636E-07 . 3232E-07
5495E+03 . 1656E-05- 1209E-02- 3311E-05- 8010E-08 . 1360E-06 . 1148E-06
5754E+03 . 1510E-05- 1155E-02- 3020E-05- 6976E-08- 1359E-07 . 1102E-06
6026E+03 . 1377E-05- 1103E-02- 2754E-05- 6076E-08- 5246E-07 . 1408E-06
6310E+03 . 1256E-05- 1053E-02- 2512E-05- 5292E-08 . 5406E-07- 4484E-07
6607E+03 . 1145E-05- 1006E-02- 2291E-05- 4609E-08- 5318E-07 . 1104E-07
6918E+03 . 1045E-05- 9607E-03- 2089E-05- 4014E-08- 3690E-07 . 3881E-07
7244E+03 . 9527E-06- 9174E-03- 1905E-05- 3496E-08- 4490E-07- 3251E-07
7586E+03 . 8689E-06- 8761E-03- 1738E-05- 3045E-08 . 1138E-06- 9036E-07
7943E+03 . 7924E-06- 8367E-03- 1585E-05- 2652E-08- 1442E-06- 2333E-07
8313E+03 . 7227E-06- 7991E-03- 1445E-05- 2310E-08- 2807E-07- 6703E-07
8710E+03 . 6591E-06- 7631E-03- 1318E-05- 2012E-08 . 4564E-08- 8080E-07
9120E+03 . 6011E-06- 7287E-03- 1202E-05- 1752E-08- 1178E-06 . 6971E-07
9550E+03 . 5482E-06- 6959E-03- 1096E-05- 1526E-08 . 1770E-06- 1014E-06
1000E+04 . 5000E-06- 6646E-03- 1.000E-06- 1329E-08 . 1309E-06 . 3243E-06

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ALPHA IS	10.	SCATTERING INDEX IS	1				
BETA	RN1	IN1	RN2	IN2	RN3	IN3	
1000E+00	9997E-01	1661E-02	2996E-01	1162E-02	1990E-03	2197E-04	
1047E+00	9997E-01	1739E-02	2996E-01	1217E-02	1988E-03	2300E-04	
1096E+00	9996E-01	1821E-02	2996E-01	1274E-02	1987E-03	2407E-04	
1148E+00	9996E-01	1907E-02	2995E-01	1334E-02	1985E-03	2520E-04	
1202E+00	9996E-01	1997E-02	2995E-01	1397E-02	1983E-03	2638E-04	
1259E+00	9995E-01	2091E-02	2994E-01	1462E-02	1982E-03	2761E-04	
1318E+00	9995E-01	2189E-02	2994E-01	1531E-02	1980E-03	2890E-04	
1380E+00	9994E-01	2292E-02	2993E-01	1603E-02	1977E-03	3024E-04	
1445E+00	9994E-01	2400E-02	2992E-01	1678E-02	1975E-03	3165E-04	
1514E+00	9993E-01	2513E-02	2992E-01	1757E-02	1972E-03	3312E-04	
1585E+00	9992E-01	2631E-02	2991E-01	1839E-02	1969E-03	3466E-04	
1660E+00	9992E-01	2755E-02	2990E-01	1926E-02	1966E-03	3627E-04	
1738E+00	9991E-01	2885E-02	2989E-01	2016E-02	1962E-03	3795E-04	
1820E+00	9990E-01	3020E-02	2988E-01	2110E-02	1958E-03	3971E-04	
1905E+00	9989E-01	3162E-02	2987E-01	2209E-02	1954E-03	4154E-04	
1995E+00	9988E-01	3311E-02	2986E-01	2313E-02	1949E-03	4345E-04	
2089E+00	9987E-01	3466E-02	2984E-01	2421E-02	1944E-03	4545E-04	
2188E+00	9986E-01	3629E-02	2983E-01	2534E-02	1938E-03	4753E-04	
2291E+00	9984E-01	3800E-02	2981E-01	2652E-02	1932E-03	4971E-04	
2399E+00	9983E-01	3978E-02	2979E-01	2776E-02	1925E-03	5197E-04	
2512E+00	9981E-01	4165E-02	2977E-01	2905E-02	1918E-03	5433E-04	
2630E+00	9979E-01	4360E-02	2975E-01	3041E-02	1910E-03	5679E-04	
2754E+00	9977E-01	4565E-02	2973E-01	3182E-02	1901E-03	5935E-04	
2884E+00	9975E-01	4778E-02	2970E-01	3330E-02	1891E-03	6202E-04	
3020E+00	9973E-01	5002E-02	2967E-01	3484E-02	1881E-03	6479E-04	
3162E+00	9970E-01	5236E-02	2964E-01	3645E-02	1869E-03	6767E-04	
3311E+00	9967E-01	5481E-02	2961E-01	3814E-02	1856E-03	7066E-04	
3467E+00	9964E-01	5738E-02	2957E-01	3990E-02	1843E-03	7377E-04	
3631E+00	9961E-01	6006E-02	2953E-01	4174E-02	1827E-03	7698E-04	
3802E+00	9957E-01	6286E-02	2949E-01	4365E-02	1811E-03	8031E-04	
3981E+00	9953E-01	6579E-02	2944E-01	4565E-02	1793E-03	8376E-04	
4169E+00	9948E-01	6885E-02	2938E-01	4774E-02	1773E-03	8732E-04	
4365E+00	9943E-01	7206E-02	2932E-01	4992E-02	1752E-03	9099E-04	
4571E+00	9938E-01	7540E-02	2926E-01	5218E-02	1729E-03	9477E-04	
4786E+00	9932E-01	7890E-02	2919E-01	5455E-02	1703E-03	9865E-04	
5012E+00	9925E-01	8256E-02	2911E-01	5701E-02	1676E-03	1026E-03	
5248E+00	9918E-01	8638E-02	2903E-01	5956E-02	1646E-03	1067E-03	
5495E+00	9910E-01	9036E-02	2894E-01	6223E-02	1613E-03	1109E-03	
5754E+00	9902E-01	9453E-02	2884E-01	6499E-02	1578E-03	1151E-03	
6026E+00	9893E-01	9887E-02	2873E-01	6786E-02	1540E-03	1195E-03	
6310E+00	9882E-01	1034E-01	2861E-01	7085E-02	1498E-03	1238E-03	
6607E+00	9871E-01	1081E-01	2848E-01	7394E-02	1453E-03	1282E-03	
6918E+00	9859E-01	1131E-01	2834E-01	7714E-02	1405E-03	1326E-03	
7244E+00	9846E-01	1182E-01	2819E-01	8045E-02	1352E-03	1370E-03	
7586E+00	9831E-01	1236E-01	2802E-01	8387E-02	1296E-03	1414E-03	
7943E+00	9815E-01	1292E-01	2784E-01	8741E-02	1236E-03	1457E-03	
8318E+00	9798E-01	1350E-01	2765E-01	9105E-02	1171E-03	1498E-03	
8710E+00	9779E-01	1410E-01	2743E-01	9480E-02	1101E-03	1539E-03	
9120E+00	9758E-01	1473E-01	2720E-01	9865E-02	1027E-03	1577E-03	
9550E+00	9736E-01	1538E-01	2695E-01	1026E-01	9484E-04	1613E-03	
1000E+01	9711E-01	1606E-01	2668E-01	1066E-01	8645E-04	1646E-03	
1047E+01	9685E-01	1676E-01	2638E-01	1108E-01	7756E-04	1676E-03	
1096E+01	9656E-01	1749E-01	2607E-01	1150E-01	6819E-04	1701E-03	
1148E+01	9624E-01	1825E-01	2572E-01	1193E-01	5834E-04	1722E-03	
1202E+01	9590E-01	1903E-01	2536E-01	1236E-01	4802E-04	1737E-03	
1259E+01	9552E-01	1984E-01	2496E-01	1280E-01	3728E-04	1745E-03	
1318E+01	9512E-01	2067E-01	2454E-01	1323E-01	2614E-04	1746E-03	
1380E+01	9468E-01	2153E-01	2408E-01	1367E-01	1466E-04	1740E-03	
1445E+01	9421E-01	2241E-01	2359E-01	1411E-01	2912E-05	1724E-03	
1514E+01	9369E-01	2332E-01	2308E-01	1455E-01	9030E-05	1699E-03	

1585E+01	9314E-01	2425E-01	2252E-01	1498E-01	2107E-04	1663E-03
1660E+01	9254E-01	2521E-01	2194E-01	1540E-01	3309E-04	1617E-03
1738E+01	9189E-01	2618E-01	2132E-01	1581E-01	4496E-04	1559E-03
1820E+01	9120E-01	2718E-01	2066E-01	1620E-01	5654E-04	1489E-03
1905E+01	9045E-01	2819E-01	1997E-01	1658E-01	6767E-04	1407E-03
1995E+01	8965E-01	2922E-01	1925E-01	1693E-01	7817E-04	1314E-03
2089E+01	8879E-01	3026E-01	1849E-01	1726E-01	8787E-04	1208E-03
2188E+01	8788E-01	3131E-01	1770E-01	1756E-01	9658E-04	1091E-03
2291E+01	8690E-01	3237E-01	1688E-01	1783E-01	1041E-03	9642E-04
2399E+01	8585E-01	3343E-01	1602E-01	1807E-01	1103E-03	8283E-04
2512E+01	8474E-01	3449E-01	1515E-01	1826E-01	1149E-03	6850E-04
2630E+01	8357E-01	3554E-01	1425E-01	1841E-01	1178E-03	5364E-04
2754E+01	8232E-01	3659E-01	1333E-01	1852E-01	1189E-03	3848E-04
2884E+01	8101E-01	3762E-01	1240E-01	1858E-01	1181E-03	2328E-04
3020E+01	7962E-01	3863E-01	1145E-01	1858E-01	1154E-03	8338E-05
3162E+01	7817E-01	3961E-01	1050E-01	1854E-01	1108E-03	6038E-05
3311E+01	7664E-01	4056E-01	9548E-02	1844E-01	1042E-03	1953E-04
3467E+01	7505E-01	4148E-01	8600E-02	1828E-01	9593E-04	3184E-04
3631E+01	7339E-01	4236E-01	7661E-02	1807E-01	8609E-04	4266E-04
3802E+01	7167E-01	4319E-01	6737E-02	1781E-01	7495E-04	5172E-04
3981E+01	6989E-01	4396E-01	5833E-02	1750E-01	6279E-04	5881E-04
4169E+01	6805E-01	4468E-01	4956E-02	1713E-01	4999E-04	6377E-04
4365E+01	6615E-01	4534E-01	4109E-02	1672E-01	3692E-04	6649E-04
4571E+01	6421E-01	4592E-01	3298E-02	1626E-01	2400E-04	6698E-04
4786E+01	6223E-01	4644E-01	2527E-02	1575E-01	1163E-04	6531E-04
5012E+01	6020E-01	4687E-01	1800E-02	1522E-01	2114E-06	6162E-04
5248E+01	5815E-01	4723E-01	1120E-02	1464E-01	9903E-05	5616E-04
5495E+01	5606E-01	4751E-01	4895E-03	1405E-01	1841E-04	4925E-04
5754E+01	5396E-01	4770E-01	8947E-04	1343E-01	2509E-04	4126E-04
6026E+01	5185E-01	4781E-01	6156E-03	1279E-01	2980E-04	3261E-04
6310E+01	4974E-01	4783E-01	1088E-02	1214E-01	3251E-04	2374E-04
6607E+01	4763E-01	4776E-01	1508E-02	1148E-01	3327E-04	1507E-04
6918E+01	4552E-01	4761E-01	1875E-02	1083E-01	3224E-04	7002E-05
7244E+01	4344E-01	4737E-01	2190E-02	1017E-01	2968E-04	1056E-06
7586E+01	4137E-01	4706E-01	2457E-02	9527E-02	2589E-04	5986E-05
7943E+01	3934E-01	4666E-01	2676E-02	8893E-02	2125E-04	1046E-04
8318E+01	3734E-01	4619E-01	2850E-02	8276E-02	1616E-04	1344E-04
8710E+01	3539E-01	4564E-01	2983E-02	7677E-02	1098E-04	1495E-04
9120E+01	3348E-01	4503E-01	3077E-02	7100E-02	6097E-05	1512E-04
9550E+01	3162E-01	4435E-01	3137E-02	6546E-02	1791E-05	1413E-04
1000E+02	2982E-01	4361E-01	3164E-02	6019E-02	1713E-05	1227E-04
1047E+02	2807E-01	4283E-01	3164E-02	5518E-02	4280E-05	9822E-05
1096E+02	2639E-01	4199E-01	3139E-02	5046E-02	5872E-05	7101E-05
1148E+02	2477E-01	4111E-01	3092E-02	4601E-02	6541E-05	4397E-05
1203E+02	2321E-01	4019E-01	3027E-02	4185E-02	6411E-05	1953E-05
1259E+02	2173E-01	3924E-01	2946E-02	3798E-02	5664E-05	5055E-07
1318E+02	2030E-01	3826E-01	2853E-02	3438E-02	4513E-05	1507E-05
1380E+02	1895E-01	3726E-01	2750E-02	3105E-02	3175E-05	2386E-05
1445E+02	1767E-01	3624E-01	2639E-02	2799E-02	1846E-05	2728E-05
1514E+02	1645E-01	3522E-01	2523E-02	2517E-02	6820E-06	2626E-05
1585E+02	1529E-01	3418E-01	2404E-02	2260E-02	2134E-06	2209E-05
1660E+02	1421E-01	3314E-01	2282E-02	2024E-02	7947E-06	1618E-05
1738E+02	1318E-01	3210E-01	2160E-02	1811E-02	1070E-05	9838E-06
1820E+02	1222E-01	3106E-01	2038E-02	1616E-02	1087E-05	4128E-06
1905E+02	1131E-01	3003E-01	1919E-02	1441E-02	9233E-06	2696E-07
1995E+02	1046E-01	2901E-01	1802E-02	1282E-02	6608E-06	3044E-06
2089E+02	9670E-02	2800E-01	1688E-02	1140E-02	3773E-06	4253E-06
2188E+02	8929E-02	2700E-01	1578E-02	1011E-02	1299E-06	4209E-06
2291E+02	8238E-02	2603E-01	1473E-02	8963E-03	4651E-07	3354E-06
2399E+02	7595E-02	2507E-01	1372E-02	7935E-03	1429E-06	2146E-06

2512E+02	6997E-02	2413E-01	1276E-02	7016E-03	1685E-06	9688E-07
2430E+02	6442E-02	2322E-01	1184E-02	6197E-03	1453E-06	6924E-08
2754E+02	5926E-02	2232E-01	1098E-02	5468E-03	9749E-07	4607E-07
2884E+02	5449E-02	2145E-01	1017E-02	4820E-03	4623E-07	6397E-07
3020E+02	5007E-02	2060E-01	9404E-03	4245E-03	6432E-08	5731E-07
3162E+02	4599E-02	1978E-01	8688E-03	3735E-03	1690E-07	3764E-07
3311E+02	4222E-02	1899E-01	8018E-03	3285E-03	2426E-07	1642E-07
3467E+02	3874E-02	1822E-01	7392E-03	2886E-03	2066E-07	7209E-09
3631E+02	3553E-02	1747E-01	6809E-03	2534E-03	1250E-07	7516E-08
3802E+02	3257E-02	1675E-01	6267E-03	2224E-03	4435E-08	8787E-08
3981E+02	2985E-02	1605E-01	5764E-03	1950E-03	1296E-08	6720E-08
4169E+02	2734E-02	1538E-01	5297E-03	1709E-03	2973E-08	3199E-08
4365E+02	2504E-02	1473E-01	4865E-03	1498E-03	2886E-08	1986E-09
4571E+02	2292E-02	1411E-01	4466E-03	1311E-03	1366E-08	9120E-09
4786E+02	2098E-02	1351E-01	4097E-03	1148E-03	2940E-09	1397E-08
5012E+02	1919E-02	1293E-01	3757E-03	1004E-03	5883E-10	8328E-09
5148E+02	1756E-02	1237E-01	3444E-03	8784E-04	1009E-08	3001E-09
5495E+02	1606E-02	1184E-01	3155E-03	7680E-04	7647E-09	2198E-09
5754E+02	1468E-02	1133E-01	2889E-03	6713E-04	1656E-09	3423E-09
6026E+02	1342E-02	1084E-01	2645E-03	5866E-04	1229E-09	3720E-09
6310E+02	1227E-02	1036E-01	2421E-03	5124E-04	2071E-09	9414E-10
6607E+02	1121E-02	9911E-02	2215E-03	4475E-04	1300E-09	2954E-09
6918E+02	1024E-02	9477E-02	2026E-03	3908E-04	1382E-09	1618E-09
7244E+02	9356E-03	9061E-02	1853E-03	3411E-04	8431E-10	2197E-09
7586E+02	8546E-03	8663E-02	1694E-03	2977E-04	1026E-09	7158E-10
7943E+02	7805E-03	8281E-02	1548E-03	2598E-04	1283E-09	5006E-09
8318E+02	7127E-03	7915E-02	1415E-03	2267E-04	4992E-09	3006E-09
8710E+02	6508E-03	7565E-02	1293E-03	1978E-04	6268E-09	3613E-09
9120E+02	5942E-03	7230E-02	1181E-03	1725E-04	3208E-09	2159E-10
9556E+02	5424E-03	6909E-02	1079E-03	1504E-04	2669E-09	1180E-08
1000E+03	4952E-03	6603E-02	9852E-04	1312E-04	5290E-09	5333E-09
1047E+03	4520E-03	6309E-02	8997E-04	1144E-04	1812E-09	2818E-09
1096E+03	4125E-03	6028E-02	8215E-04	9974E-05	3987E-09	1946E-09
1148E+03	3765E-03	5760E-02	7501E-04	8695E-05	2328E-09	9347E-09
1202E+03	3436E-03	5503E-02	6847E-04	7580E-05	5394E-09	4180E-09
1259E+03	3135E-03	5257E-02	6250E-04	6607E-05	5375E-09	1194E-09
1319E+03	2861E-03	5023E-02	5705E-04	5758E-05	2821E-09	8737E-09
1380E+03	2610E-03	4798E-02	5207E-04	5019E-05	5146E-09	5693E-09
1445E+03	2382E-03	4584E-02	4752E-04	4374E-05	8091E-09	5584E-09
1514E+03	2173E-03	4378E-02	4337E-04	3812E-05	3618E-09	3716E-09
1585E+03	1983E-03	4182E-02	3957E-04	3321E-05	1670E-08	8999E-11
1660E+03	1809E-03	3995E-02	3611E-04	2894E-05	2127E-09	3395E-09
1738E+03	1650E-03	3816E-02	3295E-04	2522E-05	3904E-09	3403E-09
1810E+03	1505E-03	3645E-02	3006E-04	2197E-05	1088E-08	7834E-09
1885E+03	1373E-03	3482E-02	2743E-04	1914E-05	2680E-11	7598E-09
1965E+03	1253E-03	3325E-02	2502E-04	1668E-05	4401E-09	6188E-09
2049E+03	1143E-03	3176E-02	2283E-04	1453E-05	1374E-08	3068E-09
2136E+03	1042E-03	3034E-02	2083E-04	1266E-05	8986E-10	1427E-08
2227E+03	9509E-04	2898E-02	1900E-04	1103E-05	3669E-08	1463E-08
2322E+03	8674E-04	2767E-02	1733E-04	9607E-06	4425E-09	8145E-09
2512E+03	7912E-04	2643E-02	1581E-04	8369E-06	4693E-10	1033E-08
2630E+03	7217E-04	2524E-02	1442E-04	7291E-06	7116E-09	2543E-08
2754E+03	6583E-04	2411E-02	1316E-04	6351E-06	5257E-09	1389E-08
2894E+03	6004E-04	2303E-02	1200E-04	5532E-06	6181E-09	8278E-09
3020E+03	5476E-04	2199E-02	1095E-04	4819E-06	4504E-10	9413E-09
3163E+03	4995E-04	2100E-02	9985E-05	4198E-06	5361E-09	1373E-08
3311E+03	4556E-04	2006E-02	9108E-05	3657E-06	2076E-09	1425E-08
3467E+03	4155E-04	1916E-02	8307E-05	3185E-06	4878E-09	6884E-08
3631E+03	3790E-04	1830E-02	7577E-05	2774E-06	2668E-08	1213E-08
3802E+03	3457E-04	1747E-02	6911E-05	2417E-06	2451E-08	9924E-10

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3981E+03 . 3153E-04 . 1669E-02 . 6304E-05 . 2105E-06 . 2591E-08 . 1093E-08
4169E+03 . 2876E-04 . 1594E-02 . 5749E-05 . 1833E-06 . 2919E-08 . 4536E-09
4365E+03 . 2623E-04 . 1522E-02 . 5244E-05 . 1597E-06 . 1418E-08 . 1216E-09
4571E+03 . 2392E-04 . 1454E-02 . 4783E-05 . 1391E-06 . 1829E-08 . 1777E-09
4786E+03 . 2182E-04 . 1388E-02 . 4362E-05 . 1212E-06 . 4422E-08 . 3511E-08
5012E+03 . 1990E-04 . 1326E-02 . 3979E-05 . 1055E-06 . 1842E-08 . 4482E-08
5248E+03 . 1815E-04 . 1266E-02 . 3629E-05 . 9192E-07 . 2415E-08 . 2041E-09
5495E+03 . 1655E-04 . 1209E-02 . 3310E-05 . 8006E-07 . 4228E-08 . 1615E-08
5754E+03 . 1510E-04 . 1155E-02 . 3019E-05 . 6973E-07 . 2811E-08 . 5709E-08
6026E+03 . 1377E-04 . 1103E-02 . 2753E-05 . 6074E-07 . 9900E-08 . 4059E-08
6310E+03 . 1256E-04 . 1053E-02 . 2511E-05 . 5290E-07 . 5366E-08 . 3041E-08
6607E+03 . 1145E-04 . 1006E-02 . 2290E-05 . 4608E-07 . 2589E-08 . 1694E-08
6918E+03 . 1044E-04 . 9605E-03 . 2089E-05 . 4013E-07 . 7901E-08 . 1559E-09
7244E+03 . 9525E-05 . 9173E-03 . 1905E-05 . 3495E-07 . 1272E-08 . 3089E-08
7586E+03 . 8687E-05 . 8760E-03 . 1737E-05 . 3044E-07 . 1343E-08 . 3865E-08
7943E+03 . 7923E-05 . 8366E-03 . 1585E-05 . 2652E-07 . 8094E-09 . 2057E-08
8313E+03 . 7226E-05 . 7990E-03 . 1445E-05 . 2310E-07 . 1581E-08 . 4030E-08
8710E+03 . 6590E-05 . 7630E-03 . 1318E-05 . 2012E-07 . 4376E-09 . 1766E-09
9120E+03 . 6011E-05 . 7287E-03 . 1202E-05 . 1752E-07 . 4521E-08 . 2626E-08
9550E+03 . 5482E-05 . 6959E-03 . 1096E-05 . 1526E-07 . 1387E-08 . 2855E-08
1000E+04 . 4999E-05 . 6646E-03 . 9998E-06 . 1329E-07 . 5326E-08 . 6591E-08

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ALPHA IS 100 SCATTERING INDEX IS 1

BETA	RN1	IN1	RN2	IN2	RN3	IN3
1000E+001	0000E-02	1662E-04	3000E-03	1163E-05	1172E-10	4704E-12
1047E+001	0000E-02	1740E-04	3000E-03	1218E-05	1172E-10	4925E-12
1096E+001	0000E-02	1822E-04	3000E-03	1275E-05	1172E-10	5157E-12
1148E+001	0000E-02	1908E-04	3000E-03	1335E-05	1172E-10	5400E-12
1202E+001	0000E-02	1998E-04	3000E-03	1398E-05	1172E-10	5655E-12
1259E+001	0000E-02	2092E-04	3000E-03	1464E-05	1172E-10	5921E-12
1318E+001	0000E-02	2191E-04	3000E-03	1533E-05	1171E-10	6199E-12
1380E+001	0000E-02	2294E-04	3000E-03	1606E-05	1171E-10	6492E-12
1445E+001	0000E-02	2402E-04	3000E-03	1681E-05	1171E-10	6797E-12
1514E+001	0000E-02	2515E-04	3000E-03	1760E-05	1171E-10	7116E-12
1585E+001	0000E-02	2634E-04	3000E-03	1843E-05	1171E-10	7452E-12
1660E+001	0000E-02	2758E-04	3000E-03	1930E-05	1171E-10	7803E-12
1738E+001	0000E-02	2888E-04	3000E-03	2021E-05	1170E-10	8169E-12
1820E+001	0000E-02	3024E-04	3000E-03	2117E-05	1170E-10	8554E-12
1905E+001	0000E-02	3166E-04	3000E-03	2216E-05	1170E-10	8956E-12
1995E+001	0000E-02	3315E-04	3000E-03	2321E-05	1169E-10	9377E-12
2089E+001	0000E-02	3472E-04	3000E-03	2430E-05	1169E-10	9818E-12
2188E+001	0000E-02	3635E-04	3000E-03	2545E-05	1169E-10	1028E-11
2291E+001	0000E-02	3807E-04	3000E-03	2665E-05	1168E-10	1076E-11
2398E+001	0000E-02	3986E-04	3000E-03	2790E-05	1168E-10	1127E-11
2512E+001	0000E-02	4174E-04	3000E-03	2922E-05	1167E-10	1180E-11
2630E+001	0000E-02	4371E-04	3000E-03	3059E-05	1166E-10	1235E-11
2754E+001	0000E-02	4577E-04	3000E-03	3203E-05	1166E-10	1293E-11
2884E+001	0000E-02	4792E-04	3000E-03	3354E-05	1165E-10	1354E-11
3020E+001	0000E-02	5018E-04	3000E-03	3512E-05	1164E-10	1417E-11
3163E+001	0000E-02	5255E-04	3000E-03	3678E-05	1164E-10	1484E-11
3311E+001	0000E-02	5502E-04	3000E-03	3851E-05	1163E-10	1553E-11
3467E+001	0000E-02	5761E-04	3000E-03	4033E-05	1162E-10	1626E-11
3631E+001	0000E-02	6033E-04	3000E-03	4223E-05	1161E-10	1702E-11
3802E+001	0000E-02	6317E-04	2999E-03	4421E-05	1159E-10	1782E-11
3981E+001	0000E-02	6615E-04	2999E-03	4630E-05	1158E-10	1865E-11
4169E+00	9999E-02	6927E-04	2999E-03	4848E-05	1157E-10	1952E-11
4365E+00	9999E-02	7253E-04	2999E-03	5077E-05	1155E-10	2043E-11
4571E+00	9999E-02	7595E-04	2999E-03	5316E-05	1153E-10	2138E-11
4786E+00	9999E-02	7953E-04	2999E-03	5566E-05	1151E-10	2237E-11
5012E+00	9999E-02	8327E-04	2999E-03	5828E-05	1149E-10	2341E-11
5248E+00	9999E-02	8720E-04	2999E-03	6103E-05	1147E-10	2449E-11
5495E+00	9999E-02	9131E-04	2999E-03	6390E-05	1144E-10	2563E-11
5754E+00	9999E-02	9561E-04	2999E-03	6691E-05	1141E-10	2682E-11
6026E+00	9999E-02	1001E-03	2999E-03	7007E-05	1138E-10	2805E-11
6310E+00	9999E-02	1048E-03	2999E-03	7336E-05	1135E-10	2934E-11
6607E+00	9999E-02	1098E-03	2998E-03	7682E-05	1131E-10	3069E-11
6918E+00	9999E-02	1149E-03	2998E-03	8044E-05	1127E-10	3210E-11
7244E+00	9998E-02	1204E-03	2998E-03	8422E-05	1123E-10	3357E-11
7586E+00	9998E-02	1260E-03	2998E-03	8819E-05	1118E-10	3509E-11
7943E+00	9998E-02	1320E-03	2998E-03	9234E-05	1113E-10	3669E-11
8318E+00	9998E-02	1382E-03	2998E-03	9669E-05	1107E-10	3835E-11
8710E+00	9998E-02	1447E-03	2997E-03	1012E-04	1101E-10	4008E-11
9120E+00	9998E-02	1515E-03	2997E-03	1060E-04	1094E-10	4188E-11
9550E+00	9997E-02	1586E-03	2997E-03	1110E-04	1086E-10	4375E-11
1000E+01	9997E-02	1661E-03	2996E-03	1162E-04	1078E-10	4569E-11
1047E+01	9997E-02	1739E-03	2996E-03	1217E-04	1069E-10	4772E-11
1096E+01	9996E-02	1821E-03	2996E-03	1274E-04	1059E-10	4981E-11
1148E+01	9996E-02	1907E-03	2995E-03	1334E-04	1048E-10	5198E-11
1202E+01	9996E-02	1997E-03	2995E-03	1397E-04	1036E-10	5422E-11
1259E+01	9995E-02	2091E-03	2994E-03	1462E-04	1023E-10	5654E-11
1318E+01	9995E-02	2189E-03	2994E-03	1531E-04	1009E-10	5894E-11
1380E+01	9994E-02	2292E-03	2993E-03	1603E-04	9939E-11	6142E-11
1445E+01	9994E-02	2400E-03	2992E-03	1678E-04	9772E-11	6396E-11
1514E+01	9993E-02	2513E-03	2792E-03	1757E-04	9589E-11	6657E-11

2512E+02	8474E-02	3449E-02	1515E-03	1826E-03	3735E-11	8110E-12
2630E+02	8357E-02	3554E-02	1425E-03	1841E-03	2808E-11	2075E-11
2754E+02	8232E-02	3659E-02	1333E-03	1852E-03	1507E-11	2787E-11
2884E+02	8101E-02	3762E-02	1240E-03	1858E-03	1131E-12	2855E-11
3020E+02	7962E-02	3863E-02	1145E-03	1858E-03	1078E-11	2318E-11
3162E+02	7817E-02	3961E-02	1050E-03	1854E-03	1819E-11	1363E-11
3311E+02	7664E-02	4056E-02	9548E-04	1844E-03	1987E-11	2621E-12
3467E+02	7505E-02	4148E-02	8600E-04	1828E-03	1615E-11	6831E-12
3631E+02	7339E-02	4236E-02	7661E-04	1807E-03	8824E-12	1235E-11
3802E+02	7167E-02	4319E-02	6737E-04	1781E-03	6006E-13	1304E-11
3981E+02	6989E-02	4396E-02	5833E-04	1750E-03	5769E-12	9479E-12
4169E+02	6805E-02	4468E-02	4956E-04	1713E-03	8587E-12	3687E-12
4365E+02	6615E-02	4534E-02	4109E-04	1672E-03	7568E-12	1783E-12
4571E+02	6421E-02	4592E-02	3298E-04	1626E-03	3974E-12	4960E-12
4786E+02	6223E-02	4644E-02	2527E-04	1575E-03	6797E-14	5221E-12
5012E+02	6020E-02	4687E-02	1800E-04	1522E-03	2782E-12	3141E-12
5248E+02	5815E-02	4723E-02	1120E-04	1464E-03	3289E-12	3528E-13
5495E+02	5606E-02	4751E-02	4895E-05	1405E-03	2074E-12	1576E-12
5754E+02	5396E-02	4770E-02	8946E-06	1343E-03	2494E-13	1994E-12
6026E+02	5185E-02	4781E-02	6156E-05	1279E-03	9770E-13	1123E-12
6310E+02	4974E-02	4783E-02	1088E-04	1214E-03	1161E-12	4090E-14
6607E+02	4763E-02	4776E-02	1508E-04	1148E-03	5090E-13	6568E-13
6918E+02	4552E-02	4761E-02	1875E-04	1083E-03	1205E-13	5781E-13
7244E+02	4344E-02	4737E-02	2190E-04	1017E-03	3513E-13	1780E-13
7586E+02	4137E-02	4706E-02	2457E-04	9527E-04	2460E-13	1425E-13
7943E+02	3934E-02	4666E-02	2676E-04	8893E-04	5372E-15	2023E-13
8318E+02	3734E-02	4619E-02	2850E-04	8276E-04	1077E-13	7224E-14
8710E+02	3539E-02	4564E-02	2983E-04	7677E-04	7307E-14	6569E-14
9120E+02	3348E-02	4503E-02	3077E-04	7100E-04	2714E-14	9650E-14
9550E+02	3162E-02	4435E-02	3137E-04	6546E-04	6268E-15	2924E-14
1000E+03	2982E-02	4361E-02	3164E-04	6019E-04	5414E-14	6786E-16
1047E+03	2807E-02	4283E-02	3164E-04	5518E-04	2781E-15	1260E-14
1096E+03	2639E-02	4199E-02	3139E-04	5046E-04	1657E-14	1400E-14
1148E+03	2477E-02	4111E-02	3092E-04	4601E-04	8342E-15	8503E-15
1202E+03	2321E-02	4019E-02	3027E-04	4185E-04	3793E-14	3469E-14
1259E+03	2173E-02	3924E-02	2946E-04	3798E-04	2519E-15	3530E-15
1318E+03	2030E-02	3826E-02	2853E-04	3438E-04	2290E-14	2003E-14
1380E+03	1895E-02	3726E-02	2750E-04	3105E-04	6819E-15	1132E-14
1445E+03	1767E-02	3624E-02	2639E-04	2799E-04	1321E-15	5769E-15
1514E+03	1645E-02	3522E-02	2523E-04	2517E-04	2484E-14	4029E-14
1585E+03	1529E-02	3418E-02	2404E-04	2260E-04	4219E-15	1709E-15
1660E+03	1421E-02	3314E-02	2282E-04	2024E-04	3709E-14	9126E-16
1738E+03	1318E-02	3210E-02	2160E-04	1811E-04	1607E-14	8319E-15
1820E+03	1222E-02	3106E-02	2038E-04	1616E-04	6528E-14	2401E-14
1905E+03	1131E-02	3003E-02	1919E-04	1441E-04	9841E-15	3494E-14
1993E+03	1046E-02	2901E-02	1802E-04	1282E-04	2075E-14	1020E-14
2084E+03	9670E-03	2800E-02	1688E-04	1140E-04	1700E-14	3044E-14
2188E+03	8929E-03	2700E-02	1578E-04	1011E-04	4550E-15	1914E-14
2291E+03	8238E-03	2603E-02	1473E-04	8963E-05	4222E-14	7284E-14
2399E+03	7595E-03	2507E-02	1372E-04	7935E-05	7014E-14	4452E-14
2512E+03	6977E-03	2413E-02	1276E-04	7016E-05	2365E-14	1039E-13
2630E+03	6442E-03	2322E-02	1184E-04	6197E-05	3873E-14	1211E-14
2754E+03	5926E-03	2232E-02	1098E-04	5468E-05	2499E-14	1486E-15
2884E+03	5449E-03	2145E-02	1017E-04	4820E-05	4422E-14	4750E-14
3020E+03	5007E-03	2060E-02	9405E-05	4245E-05	3237E-14	7736E-14
3162E+03	4599E-03	1978E-02	8688E-05	3735E-05	5773E-14	1616E-14
3311E+03	4222E-03	1899E-02	8017E-05	3285E-05	6491E-14	2227E-16
3467E+03	3874E-03	1822E-02	7392E-05	2836E-05	1314E-13	3208E-15
3631E+03	3553E-03	1747E-02	6809E-05	2534E-05	2278E-14	7497E-14
3802E+03	3257E-03	1675E-02	6267E-05	2224E-05	6149E-14	1482E-13

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. 3981E+03 . 2785E-03- . 1605E-02- . 5764E-05- . 1950E-05 . 3206E-14- . 1574E-14
. 4169E+03 . 2734E-03- . 1536E-02- . 5297E-05- . 1709E-05- . 1065E-13 . 4068E-14
. 4365E+03 . 2504E-03- . 1473E-02- . 4865E-05- . 1498E-05- . 1178E-13 . 1103E-13
. 4571E+03 . 2292E-03- . 1411E-02- . 4466E-05- . 1311E-05- . 8138E-14- . 3670E-15
. 4786E+03 . 2098E-03- . 1351E-02- . 4097E-05- . 1148E-05- . 6038E-14- . 4717E-14
. 5012E+03 . 1919E-03- . 1293E-02- . 3757E-05- . 1004E-05- . 5676E-14- . 9519E-14
. 5248E+03 . 1756E-03- . 1237E-02- . 3444E-05- . 8784E-06- . 5767E-15- . 1201E-13
. 5495E+03 . 1606E-03- . 1184E-02- . 3155E-05- . 7680E-06- . 2404E-14 . 5317E-14
. 5754E+03 . 1468E-03- . 1133E-02- . 2889E-05- . 6713E-06 . 1187E-13- . 4664E-14
. 6026E+03 . 1342E-03- . 1084E-02- . 2645E-05- . 5866E-06- . 4038E-14 . 4626E-14
. 6310E+03 . 1227E-03- . 1036E-02- . 2421E-05- . 5124E-06 . 4184E-13- . 2511E-13
. 6607E+03 . 1121E-03- . 9911E-03- . 2215E-05- . 4475E-06- . 4743E-14- . 1472E-13
. 6918E+03 . 1024E-03- . 9477E-03- . 2026E-05- . 3908E-06- . 1167E-13 . 6351E-14
. 7244E+03 . 9356E-04- . 9061E-03- . 1853E-05- . 3411E-06- . 9961E-14- . 3095E-13
. 7586E+03 . 8546E-04- . 8663E-03- . 1694E-05- . 2977E-06- . 4054E-14 . 1180E-13
. 7943E+03 . 7805E-04- . 8281E-03- . 1548E-05- . 2598E-06- . 2750E-14- . 1014E-13
. 8318E+03 . 7127E-04- . 7915E-03- . 1415E-05- . 2267E-06 . 8208E-14- . 1756E-13
. 8710E+03 . 6508E-04- . 7565E-03- . 1293E-05- . 1978E-06- . 4677E-14- . 8053E-14
. 9120E+03 . 5942E-04- . 7230E-03- . 1181E-05- . 1725E-06 . 1402E-13- . 2314E-13
. 9550E+03 . 5424E-04- . 6909E-03- . 1079E-05- . 1504E-06 . 1647E-13 . 2963E-14
. 1000E+04 . 4952E-04- . 6603E-03- . 9852E-06- . 1312E-06 . 1490E-13- . 1405E-13

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ALPHA IS	1.	SCATTERING INDEX IS	3				
BETA	RN1	IN1	RN2	IN2	RN3	IN3	
1000E+00	1897E+01-	1178E+01	2039E+01-	2064E+02-	3429E+00-	4439E+01	
1047E+00	1850E+01-	1187E+01	1371E+01-	1980E+02-	4804E+00-	4225E+01	
1096E+00	1804E+01-	1195E+01	7562E+00-	1896E+02-	6044E+00-	4012E+01	
1148E+00	1756E+01-	1201E+01	1937E+00-	1812E+02-	7151E+00-	3799E+01	
1202E+00	1709E+01-	1207E+01-	3178E+00-	1728E+02-	8129E+00-	3589E+01	
1259E+00	1661E+01-	1211E+01-	7799E+00-	1646E+02-	8983E+00-	3382E+01	
1318E+00	1613E+01-	1213E+01-	1194E+01-	1564E+02-	9717E+00-	3179E+01	
1380E+00	1565E+01-	1214E+01-	1562E+01-	1484E+02-	1034E+01-	2980E+01	
1445E+00	1517E+01-	1214E+01-	1886E+01-	1405E+02-	1085E+01-	2786E+01	
1514E+00	1469E+01-	1213E+01-	2168E+01-	1328E+02-	1125E+01-	2597E+01	
1585E+00	1422E+01-	1210E+01-	2410E+01-	1253E+02-	1156E+01-	2415E+01	
1660E+00	1374E+01-	1206E+01-	2615E+01-	1180E+02-	1178E+01-	2238E+01	
1738E+00	1327E+01-	1201E+01-	2784E+01-	1110E+02-	1192E+01-	2069E+01	
1820E+00	1281E+01-	1194E+01-	2921E+01-	1042E+02-	1198E+01-	1906E+01	
1905E+00	1234E+01-	1186E+01-	3027E+01-	9764E+01-	1196E+01-	1750E+01	
1995E+00	1189E+01-	1177E+01-	3105E+01-	9136E+01-	1188E+01-	1602E+01	
2089E+00	1144E+01-	1167E+01-	3158E+01-	8534E+01-	1175E+01-	1461E+01	
2188E+00	1099E+01-	1156E+01-	3187E+01-	7959E+01-	1156E+01-	1328E+01	
2291E+00	1056E+01-	1144E+01-	3196E+01-	7412E+01-	1132E+01-	1202E+01	
2399E+00	1013E+01-	1130E+01-	3186E+01-	6892E+01-	1105E+01-	1083E+01	
2512E+00	9711E+00-	1116E+01-	3160E+01-	6399E+01-	1074E+01-	9722E+00	
2630E+00	9301E+00-	1101E+01-	3119E+01-	5932E+01-	1040E+01-	8682E+00	
2754E+00	8899E+00-	1085E+01-	3065E+01-	5491E+01-	1004E+01-	7712E+00	
2884E+00	8507E+00-	1069E+01-	3001E+01-	5076E+01-	9652E+00-	6811E+00	
3020E+00	8126E+00-	1051E+01-	2928E+01-	4685E+01-	9253E+00-	5977E+00	
3162E+00	7754E+00-	1033E+01-	2846E+01-	4318E+01-	8842E+00-	5207E+00	
3311E+00	7393E+00-	1014E+01-	2759E+01-	3974E+01-	8423E+00-	4498E+00	
3467E+00	7043E+00-	9953E+00-	2666E+01-	3653E+01-	8000E+00-	3849E+00	
3631E+00	6703E+00-	9756E+00-	2569E+01-	3352E+01-	7576E+00-	3257E+00	
3803E+00	6375E+00-	9556E+00-	2469E+01-	3072E+01-	7153E+00-	2718E+00	
3981E+00	6057E+00-	9351E+00-	2367E+01-	2812E+01-	6734E+00-	2230E+00	
4169E+00	5751E+00-	9144E+00-	2264E+01-	2570E+01-	6322E+00-	1790E+00	
4365E+00	5456E+00-	8934E+00-	2161E+01-	2346E+01-	5917E+00-	1395E+00	
4571E+00	5172E+00-	8722E+00-	2057E+01-	2139E+01-	5522E+00-	1043E+00	
4786E+00	4899E+00-	8509E+00-	1955E+01-	1948E+01-	5138E+00-	7312E-01	
5012E+00	4636E+00-	8295E+00-	1854E+01-	1772E+01-	4767E+00-	4558E-01	
5248E+00	4385E+00-	8081E+00-	1755E+01-	1610E+01-	4409E+00-	2148E-01	
5495E+00	4144E+00-	7867E+00-	1659E+01-	1461E+01-	4065E+00-	5631E-03	
5754E+00	3913E+00-	7654E+00-	1565E+01-	1324E+01-	3736E+00	1743E-01	
6028E+00	3693E+00-	7441E+00-	1474E+01-	1199E+01-	3422E+00	3275E-01	
6310E+00	3482E+00-	7230E+00-	1386E+01-	1085E+01-	3123E+00	4561E-01	
6607E+00	3281E+00-	7021E+00-	1302E+01-	9812E+00-	2841E+00	5618E-01	
6918E+00	3090E+00-	6813E+00-	1221E+01-	8863E+00-	2574E+00	6476E-01	
7244E+00	2907E+00-	6608E+00-	1144E+01-	7999E+00-	2323E+00	7146E-01	
7586E+00	2733E+00-	6406E+00-	1070E+01-	7213E+00-	2087E+00	7649E-01	
7943E+00	2568E+00-	6206E+00-	1000E+01-	6498E+00-	1867E+00	8011E-01	
8318E+00	2411E+00-	6009E+00-	9341E+00-	5850E+00-	1661E+00	8236E-01	
8710E+00	2261E+00-	5815E+00-	8713E+00-	5261E+00-	1471E+00	8344E-01	
9120E+00	2120E+00-	5624E+00-	8119E+00-	4728E+00-	1294E+00	8352E-01	
9550E+00	1986E+00-	5437E+00-	7560E+00-	4245E+00-	1132E+00	8272E-01	
1000E+01	1859E+00-	5253E+00-	7032E+00-	3808E+00-	9821E-01	8113E-01	
1047E+01	1739E+00-	5074E+00-	6536E+00-	3413E+00-	8454E-01	7894E-01	
1096E+01	1626E+00-	4897E+00-	6070E+00-	3056E+00-	7209E-01	7621E-01	
1148E+01	1519E+00-	4725E+00-	5632E+00-	2733E+00-	6079E-01	7303E-01	
1202E+01	1418E+00-	4557E+00-	5222E+00-	2443E+00-	5061E-01	6951E-01	
1259E+01	1324E+00-	4393E+00-	4837E+00-	2181E+00-	4146E-01	6572E-01	
1318E+01	1234E+00-	4233E+00-	4478E+00-	1945E+00-	3330E-01	6174E-01	
1380E+01	1151E+00-	4077E+00-	4142E+00-	1734E+00-	2607E-01	5762E-01	
1445E+01	1072E+00-	3925E+00-	3829E+00-	1544E+00-	1971E-01	5344E-01	
1514E+01	9986E-01-	3777E+00-	3537E+00-	1373E+00-	1416E-01	4923E-01	

1585E+01	9296E-01	3634E+00	3264E+00	1221E+00	9355E-02	4505E-01
1660E+01	8651E-01	3495E+00	3011E+00	1084E+00	5249E-02	4094E-01
1738E+01	8048E-01	3360E+00	2776E+00	9622E-01	1783E-02	3694E-01
1820E+01	7484E-01	3229E+00	2557E+00	8534E-01	1097E-02	3306E-01
1905E+01	6957E-01	3103E+00	2354E+00	7565E-01	3443E-02	2935E-01
1995E+01	6465E-01	2981E+00	2166E+00	6701E-01	5307E-02	2582E-01
2089E+01	6006E-01	2863E+00	1992E+00	5934E-01	6736E-02	2249E-01
2188E+01	5579E-01	2748E+00	1831E+00	5251E-01	7778E-02	1937E-01
2291E+01	5180E-01	2638E+00	1683E+00	4646E-01	8478E-02	1648E-01
2399E+01	4808E-01	2532E+00	1545E+00	4109E-01	8880E-02	1382E-01
2512E+01	4461E-01	2429E+00	1419E+00	3632E-01	9024E-02	1139E-01
2630E+01	4138E-01	2330E+00	1302E+00	3211E-01	8950E-02	9204E-02
2754E+01	3838E-01	2235E+00	1194E+00	2837E-01	8694E-02	7246E-02
2884E+01	3557E-01	2143E+00	1095E+00	2506E-01	8290E-02	5518E-02
3020E+01	3296E-01	2055E+00	1004E+00	2214E-01	7771E-02	4011E-02
3162E+01	3053E-01	1970E+00	9204E-01	1955E-01	7166E-02	2717E-02
3311E+01	2827E-01	1888E+00	8434E-01	1726E-01	6502E-02	1626E-02
3467E+01	2616E-01	1810E+00	7727E-01	1523E-01	5804E-02	7241E-03
3631E+01	2420E-01	1734E+00	7077E-01	1344E-01	5092E-02	1772E-05
3802E+01	2237E-01	1661E+00	6481E-01	1186E-01	4386E-02	5669E-03
3981E+01	2063E-01	1591E+00	5934E-01	1046E-01	3703E-02	9872E-03
4169E+01	1910E-01	1524E+00	5432E-01	9225E-02	3055E-02	1279E-02
4365E+01	1763E-01	1459E+00	4971E-01	8132E-02	2454E-02	1459E-02
4571E+01	1637E-01	1397E+00	4549E-01	7166E-02	1908E-02	1545E-02
4788E+01	1500E-01	1338E+00	4162E-01	6313E-02	1422E-02	1551E-02
5012E+01	1383E-01	1281E+00	3808E-01	5558E-02	9995E-03	1496E-02
5248E+01	1274E-01	1226E+00	3483E-01	4893E-02	6417E-03	1393E-02
5495E+01	1173E-01	1173E+00	3185E-01	4305E-02	3474E-03	1256E-02
5754E+01	1080E-01	1122E+00	2912E-01	3786E-02	1138E-03	1097E-02
6026E+01	9936E-02	1074E+00	2663E-01	3328E-02	6346E-04	9293E-03
6310E+01	9136E-02	1027E+00	2434E-01	2924E-02	1898E-03	7604E-03
6607E+01	8398E-02	9826E-01	2225E-01	2568E-02	2716E-03	5983E-03
6918E+01	7716E-02	9398E-01	2033E-01	2254E-02	3158E-03	4491E-03
7244E+01	7087E-02	8988E-01	1858E-01	1978E-02	3294E-03	3168E-03
7586E+01	6506E-02	8594E-01	1698E-01	1735E-02	3195E-03	2040E-03
7943E+01	5971E-02	8218E-01	1551E-01	1521E-02	2926E-03	1118E-03
8318E+01	5479E-02	7857E-01	1417E-01	1333E-02	2547E-03	4010E-04
8710E+01	5025E-02	7511E-01	1294E-01	1168E-02	2110E-03	1241E-04
9120E+01	4608E-02	7180E-01	1182E-01	1023E-02	1659E-03	4768E-04
9550E+01	4225E-02	6863E-01	1079E-01	8952E-03	1228E-03	6822E-04
1000E+02	3873E-02	6560E-01	9854E-02	7834E-03	8392E-04	7681E-04
1047E+02	3549E-02	6270E-01	8997E-02	6853E-03	5097E-04	7633E-04
1096E+02	3252E-02	5992E-01	8213E-02	5993E-03	2465E-04	6948E-04
1148E+02	2980E-02	5726E-01	7498E-02	5240E-03	5047E-05	5875E-04
1202E+02	2730E-02	5472E-01	6844E-02	4580E-03	8272E-05	4621E-04
1259E+02	2501E-02	5229E-01	6247E-02	4002E-03	1610E-04	3353E-04
1318E+02	2291E-02	4996E-01	5702E-02	3496E-03	1948E-04	2193E-04
1380E+02	2098E-02	4774E-01	5204E-02	3054E-03	1955E-04	1217E-04
1445E+02	1922E-02	4561E-01	4749E-02	2667E-03	1738E-04	4645E-05
1514E+02	1760E-02	4357E-01	4333E-02	2329E-03	1395E-04	6064E-06
1585E+02	1613E-02	4163E-01	3954E-02	2033E-03	1010E-04	3781E-05
1660E+02	1477E-02	3977E-01	3608E-02	1775E-03	6439E-05	5221E-05
1738E+02	1353E-02	3799E-01	3292E-02	1549E-03	3334E-05	5379E-05
1820E+02	1240E-02	3630E-01	3004E-02	1352E-03	1011E-05	4701E-05
1905E+02	1136E-02	3467E-01	2740E-02	1179E-03	5203E-06	3589E-05
1995E+02	1041E-02	3312E-01	2500E-02	1029E-03	1329E-05	2372E-05
2089E+02	9539E-03	3164E-01	2281E-02	8979E-04	1571E-05	1280E-05
2188E+02	8742E-03	3022E-01	2081E-02	7834E-04	1435E-05	4419E-06
2291E+02	8013E-03	2887E-01	1898E-02	6835E-04	1098E-05	1181E-06
2399E+02	7345E-03	2758E-01	1732E-02	5963E-04	6968E-06	3924E-06

2512E+02	6734E-03	2634E-01	1580E-02	5202E-04	3415E-06	4742E-06
2630E+02	6174E-03	2516E-01	1441E-02	4539E-04	7586E-07	4123E-06
2754E+02	5662E-03	2404E-01	1314E-02	3960E-04	7104E-07	2764E-06
2884E+02	5192E-03	2296E-01	1199E-02	3455E-04	1374E-06	1480E-06
300E+02	4761E-03	2193E-01	1094E-02	3015E-04	1287E-06	5916E-07
3162E+02	4366E-03	2095E-01	9976E-03	2630E-04	1058E-06	2110E-07
3311E+02	4005E-03	2001E-01	9100E-03	2295E-04	6634E-07	4375E-07
3467E+02	3673E-03	1911E-01	8300E-03	2003E-04	1872E-07	4678E-07
3631E+02	3369E-03	1825E-01	7571E-03	1748E-04	6435E-08	3679E-07
3802E+02	3089E-03	1743E-01	6905E-03	1525E-04	1366E-08	3511E-07
3981E+02	2833E-03	1665E-01	6299E-03	1331E-04	6886E-08	8259E-08
4169E+02	2598E-03	1590E-01	5745E-03	1162E-04	4686E-08	1114E-07
4365E+02	2382E-03	1519E-01	5240E-03	1014E-04	4734E-08	3650E-08
4571E+02	2184E-03	1451E-01	4779E-03	8851E-05	5043E-09	8847E-08
4786E+02	2002E-03	1386E-01	4359E-03	7726E-05	1447E-08	1047E-08
5012E+02	1835E-03	1324E-01	3976E-03	6743E-05	1386E-07	3464E-08
5243E+02	1682E-03	1264E-01	3626E-03	5886E-05	1615E-08	1029E-08
5480E+02	1541E-03	1207E-01	3308E-03	5137E-05	9569E-08	5996E-08
5734E+02	1412E-03	1153E-01	3017E-03	4484E-05	7012E-08	2613E-08
6026E+02	1293E-03	1101E-01	2752E-03	3914E-05	7311E-08	5386E-08
6310E+02	1184E-03	1052E-01	2510E-03	3416E-05	1194E-07	1039E-07
6607E+02	1085E-03	1005E-01	2289E-03	2981E-05	1367E-07	2899E-07
6918E+02	9929E-04	9596E-02	2088E-03	2601E-05	7801E-08	7978E-08
7244E+02	9088E-04	9165E-02	1904E-03	2270E-05	9009E-08	1043E-07
7586E+02	8316E-04	8753E-02	1737E-03	1980E-05	3678E-08	6195E-08
7943E+02	7609E-04	8359E-02	1584E-03	1728E-05	9684E-08	9717E-08
8318E+02	6960E-04	7984E-02	1445E-03	1507E-05	3264E-08	1301E-07
8710E+02	6366E-04	7625E-02	1318E-03	1315E-05	6132E-08	8656E-09
9120E+02	5821E-04	7282E-02	1202E-03	1147E-05	1048E-07	5009E-07
9550E+02	5322E-04	6955E-02	1096E-03	1001E-05	1570E-07	1745E-07
1000E+03	4865E-04	6642E-02	9996E-04	8726E-06	1454E-07	3036E-08
1047E+03	4446E-04	6344E-02	9116E-04	7610E-06	1853E-07	2360E-07
1096E+03	4063E-04	6058E-02	8315E-04	6636E-06	2316E-07	1226E-08
1148E+03	3713E-04	5786E-02	7583E-04	5786E-06	2259E-07	1453E-07
1202E+03	3392E-04	5526E-02	6916E-04	5045E-06	4186E-07	2146E-07
1259E+03	3098E-04	5277E-02	6308E-04	4398E-06	3407E-07	1677E-07
1318E+03	2830E-04	5040E-02	5753E-04	3834E-06	1232E-07	1947E-07
1380E+03	2584E-04	4813E-02	5247E-04	3342E-06	3783E-07	2373E-07
1445E+03	2360E-04	4597E-02	4785E-04	2913E-06	1205E-07	1747E-07
1514E+03	2155E-04	4390E-02	4364E-04	2539E-06	3296E-07	5755E-09
1585E+03	1967E-04	4192E-02	3980E-04	2213E-06	1220E-07	4334E-08
1660E+03	1796E-04	4004E-02	3630E-04	1929E-06	5356E-07	1096E-07
1738E+03	1639E-04	3824E-02	3311E-04	1681E-06	2433E-07	3186E-08
1820E+03	1496E-04	3652E-02	3020E-04	1465E-06	5230E-07	2684E-07
1905E+03	1366E-04	3487E-02	2754E-04	1276E-06	2139E-07	1966E-07
1995E+03	1247E-04	3330E-02	2512E-04	1112E-06	1980E-08	7148E-08
2089E+03	1138E-04	3181E-02	2291E-04	9690E-07	2480E-07	9912E-07
2188E+03	1038E-04	3038E-02	2089E-04	8443E-07	1261E-07	1305E-07
2291E+03	9473E-05	2901E-02	1905E-04	7356E-07	4900E-07	7477E-07
2399E+03	8643E-05	2770E-02	1738E-04	6409E-07	1173E-06	6276E-08
2512E+03	7886E-05	2646E-02	1585E-04	5584E-07	1155E-08	9951E-07
2630E+03	7196E-05	2537E-02	1445E-04	4865E-07	4336E-07	1543E-07
2754E+03	6565E-05	2413E-02	1318E-04	4238E-07	2065E-07	7838E-07
2884E+03	5989E-05	2304E-02	1202E-04	3692E-07	1279E-06	8692E-07
3020E+03	5464E-05	2201E-02	1096E-04	3216E-07	2110E-07	2028E-06
3163E+03	4985E-05	2102E-02	9999E-05	2802E-07	1258E-06	8983E-07
3311E+03	4547E-05	2007E-02	9120E-05	2441E-07	2268E-07	6306E-07
3467E+03	4148E-05	1917E-02	8317E-05	2126E-07	5798E-07	1238E-06
3631E+03	3784E-05	1830E-02	7585E-05	1852E-07	2491E-07	3145E-07
3802E+03	3452E-05	1748E-02	6918E-05	1613E-07	2474E-07	5422E-07

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3981E+03 . 3149E-05- . 1669E-02- . 6309E-05- . 1405E-07- . 7351E-07 . 3097E-07
4169E+03 . 2872E-05- . 1594E-02- . 5754E-05- . 1224E-07- . 1020E-06 . 1834E-07
4385E+03 . 2620E-05- . 1523E-02- . 5343E-05- . 1066E-07- . 9205E-07- . 4466E-07
4571E+03 . 2390E-05- . 1454E-02- . 4786E-05- . 9288E-08 . 1841E-06 . 1359E-07
4786E+03 . 2180E-05- . 1389E-02- . 4365E-05- . 8090E-08- . 1651E-06 . 1528E-06
5012E+03 . 1988E-05- . 1326E-02- . 3981E-05- . 7047E-08- . 1582E-06 . 6445E-07
5248E+03 . 1813E-05- . 1266E-02- . 3631E-05- . 6138E-08 . 7132E-07 . 6443E-07
5485E+03 . 1654E-05- . 1209E-02- . 3311E-05- . 5346E-08- . 3164E-07 . 1436E-06
5754E+03 . 1509E-05- . 1155E-02- . 3020E-05- . 4657E-08 . 1340E-06 . 9695E-07
6026E+03 . 1376E-05- . 1103E-02- . 2754E-05- . 4056E-08 . 3786E-07 . 1906E-06
6310E+03 . 1255E-05- . 1053E-02- . 2512E-05- . 3533E-08- . 1440E-06- . 9028E-07
6607E+03 . 1145E-05- . 1006E-02- . 2291E-05- . 3077E-08- . 6700E-07- . 1317E-06
6918E+03 . 1044E-05- . 9607E-03- . 2089E-05- . 2680E-08- . 2882E-07- . 1928E-07
7244E+03 . 9522E-06- . 9174E-03- . 1905E-05- . 2334E-08- . 2086E-06 . 4591E-08
7586E+03 . 8684E-06- . 8761E-03- . 1738E-05- . 2033E-08- . 3622E-07- . 3327E-07
7943E+03 . 7921E-06- . 8367E-03- . 1585E-05- . 1771E-08- . 3186E-06- . 1774E-06
8318E+03 . 7224E-06- . 7991E-03- . 1445E-05- . 1542E-08- . 2212E-06 . 2314E-06
8710E+03 . 6589E-06- . 7631E-03- . 1318E-05- . 1343E-08 . 8460E-07 . 5851E-07
9120E+03 . 6009E-06- . 7287E-03- . 1202E-05- . 1170E-08- . 1954E-06- . 5413E-07
9550E+03 . 5481E-06- . 6959E-03- . 1096E-05- . 1019E-08 . 3454E-06- . 1186E-06
1000E+04 . 4998E-06- . 6646E-03- . 1000E-06- . 8877E-09- . 2396E-07 . 1355E-06

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SCAT. INDEX	SC	SCATTERING INDEX IS	3		
RN1	IN1	RN2	IN2	RN3	IN3
2966E+00	2550E-01	5474E+00	1683E+00	6177E-01	2985E-01
2962E+00	2666E-01	5430E+00	1746E+00	6085E-01	3089E-01
2959E+00	2780E-01	5382E+00	1811E+00	5987E-01	3195E-01
2953E+00	2908E-01	5332E+00	1876E+00	5882E-01	3301E-01
2951E+00	3037E-01	5278E+00	1943E+00	5771E-01	3407E-01
2947E+00	3170E-01	5220E+00	2010E+00	5652E-01	3513E-01
2942E+00	3308E-01	5158E+00	2077E+00	5526E-01	3618E-01
2937E+00	3451E-01	5093E+00	2145E+00	5392E-01	3721E-01
2931E+00	3599E-01	5023E+00	2213E+00	5251E-01	3823E-01
2925E+00	3753E-01	4949E+00	2281E+00	5102E-01	3922E-01
2919E+00	3911E-01	4871E+00	2349E+00	4945E-01	4019E-01
2911E+00	4075E-01	4789E+00	2416E+00	4781E-01	4112E-01
2904E+00	4244E-01	4702E+00	2480E+00	4608E-01	4206E-01
2896E+00	4418E-01	4611E+00	2547E+00	4426E-01	4283E-01
2887E+00	4598E-01	4516E+00	2610E+00	4241E-01	4361E-01
2877E+00	4783E-01	4416E+00	2671E+00	4047E-01	4432E-01
2867E+00	4973E-01	4312E+00	2730E+00	3846E-01	4496E-01
2856E+00	5168E-01	4204E+00	2787E+00	3638E-01	4553E-01
2844E+00	5367E-01	4092E+00	2841E+00	3424E-01	4600E-01
2831E+00	5571E-01	3975E+00	2891E+00	3205E-01	4639E-01
2818E+00	5780E-01	3855E+00	2938E+00	2981E-01	4668E-01
2803E+00	5992E-01	3731E+00	2981E+00	2754E-01	4686E-01
2788E+00	6209E-01	3604E+00	3020E+00	2522E-01	4694E-01
2772E+00	6429E-01	3474E+00	3055E+00	2289E-01	4690E-01
2754E+00	6653E-01	3341E+00	3083E+00	2053E-01	4674E-01
2736E+00	6879E-01	3205E+00	3110E+00	1817E-01	4647E-01
2716E+00	7108E-01	3068E+00	3129E+00	1582E-01	4606E-01
2696E+00	7338E-01	2929E+00	3143E+00	1349E-01	4554E-01
2674E+00	7570E-01	2788E+00	3152E+00	1116E-01	4488E-01
2651E+00	7803E-01	2647E+00	3155E+00	8883E-02	4411E-01
2627E+00	8037E-01	2505E+00	3152E+00	6651E-02	4321E-01
2601E+00	8270E-01	2363E+00	3144E+00	4478E-02	4216E-01
2575E+00	8502E-01	2222E+00	3129E+00	2373E-02	4102E-01
2547E+00	8733E-01	2082E+00	3109E+00	3491E-03	3977E-01
2518E+00	8962E-01	1943E+00	3083E+00	1588E-02	3841E-01
2487E+00	9188E-01	1805E+00	3051E+00	3425E-02	3696E-01
2456E+00	9411E-01	1671E+00	3013E+00	5154E-02	3541E-01
2423E+00	9629E-01	1538E+00	2971E+00	6767E-02	3378E-01
2389E+00	9843E-01	1409E+00	2923E+00	8257E-02	3208E-01
2353E+00	1005E+00	1283E+00	2870E+00	9618E-02	3031E-01
2317E+00	1025E+00	1161E+00	2813E+00	1085E-01	2849E-01
2279E+00	1045E+00	1044E+00	2751E+00	1193E-01	2662E-01
2241E+00	1063E+00	9301E-01	2686E+00	1288E-01	2474E-01
2201E+00	1081E+00	8213E-01	2617E+00	1369E-01	2284E-01
2160E+00	1098E+00	7174E-01	2545E+00	1435E-01	2093E-01
2118E+00	1114E+00	6185E-01	2469E+00	1487E-01	1903E-01
2075E+00	1129E+00	5249E-01	2392E+00	1525E-01	1715E-01
2032E+00	1143E+00	4365E-01	2312E+00	1549E-01	1530E-01
1987E+00	1156E+00	3535E-01	2231E+00	1560E-01	1350E-01
1942E+00	1167E+00	2760E-01	2148E+00	1559E-01	1175E-01
1897E+00	1178E+00	2039E-01	2064E+00	1545E-01	1006E-01
1850E+00	1187E+00	1371E-01	1980E+00	1520E-01	8443E-02
1804E+00	1195E+00	7562E-02	1896E+00	1485E-01	6906E-02
1756E+00	1201E+00	1937E-02	1812E+00	1440E-01	5463E-02
1709E+00	1207E+00	3178E-02	1728E+00	1386E-01	4114E-02
1661E+00	1211E+00	7799E-02	1646E+00	1325E-01	2865E-02
1613E+00	1213E+00	1194E-01	1564E+00	1257E-01	1718E-02
1565E+00	1214E+00	1562E-01	1484E+00	1184E-01	6771E-03
1517E+00	1214E+00	1886E-01	1405E+00	1106E-01	2565E-03
1469E+00	1213E+00	2168E-01	1328E+00	1024E-01	1079E-02

1536E+01	1422E+00	1210E+00	2410E-01	1253E+00	9404E-02	1795E-02
1660E+01	1374E+00	1206E+00	2615E-01	1180E+00	8553E-02	2406E-02
1738E+01	1327E+00	1201E+00	2784E-01	1110E+00	7699E-02	2914E-02
1820E+01	1281E+00	1194E+00	2921E-01	1042E+00	6851E-02	3322E-02
1905E+01	1234E+00	1186E+00	3027E-01	9764E-01	6018E-02	3633E-02
1995E+01	1189E+00	1177E+00	3105E-01	9136E-01	5209E-02	3853E-02
2089E+01	1144E+00	1167E+00	3158E-01	8534E-01	4430E-02	3989E-02
2188E+01	1099E+00	1156E+00	3187E-01	7959E-01	3690E-02	4045E-02
2291E+01	1056E+00	1144E+00	3196E-01	7412E-01	2993E-02	4029E-02
2399E+01	1013E+00	1130E+00	3186E-01	6892E-01	2344E-02	3949E-02
2513E+01	9711E-01	1116E+00	3160E-01	6399E-01	1748E-02	3813E-02
2630E+01	9301E-01	1101E+00	3119E-01	5932E-01	1208E-02	3628E-02
2754E+01	8899E-01	1085E+00	3065E-01	5491E-01	7265E-03	3402E-02
2884E+01	8507E-01	1069E+00	3001E-01	5076E-01	3039E-03	3145E-02
3020E+01	8126E-01	1051E+00	2928E-01	4685E-01	5925E-04	2862E-02
3167E+01	7754E-01	1033E+00	2846E-01	4318E-01	3635E-03	2564E-02
3316E+01	7393E-01	1014E+00	2759E-01	3974E-01	6108E-03	2256E-02
3467E+01	7043E-01	9953E-01	2666E-01	3653E-01	8020E-03	1946E-02
3621E+01	6703E-01	9756E-01	2569E-01	3352E-01	9418E-03	1640E-02
3780E+01	6375E-01	9556E-01	2469E-01	3072E-01	1033E-02	1345E-02
3941E+01	6057E-01	9351E-01	2367E-01	2812E-01	1081E-02	1065E-02
4104E+01	5751E-01	9144E-01	2264E-01	2570E-01	1089E-02	8050E-03
4269E+01	5456E-01	8934E-01	2161E-01	2346E-01	1064E-02	5684E-03
4437E+01	5172E-01	8722E-01	2057E-01	2139E-01	1010E-02	3581E-03
4608E+01	4899E-01	8509E-01	1955E-01	1948E-01	9329E-03	1759E-03
4783E+01	4636E-01	8295E-01	1854E-01	1772E-01	8387E-03	2299E-04
4961E+01	4385E-01	8081E-01	1755E-01	1610E-01	7327E-03	1006E-03
5143E+01	4144E-01	7867E-01	1659E-01	1461E-01	6201E-03	1953E-03
5328E+01	3913E-01	7654E-01	1565E-01	1324E-01	5057E-03	2627E-03
5516E+01	3693E-01	7441E-01	1474E-01	1199E-01	3939E-03	3048E-03
5707E+01	3482E-01	7230E-01	1386E-01	1085E-01	2855E-03	3241E-03
5901E+01	3281E-01	7027E-01	1302E-01	9812E-02	1927E-03	3239E-03
6100E+01	3090E-01	6813E-01	1221E-01	8863E-02	1088E-03	3076E-03
6303E+01	2907E-01	6608E-01	1144E-01	7999E-02	3837E-04	2789E-03
6510E+01	2733E-01	6406E-01	1070E-01	7213E-02	1761E-04	2414E-03
6721E+01	2568E-01	6206E-01	1000E-01	6498E-02	5911E-04	1987E-03
6936E+01	2411E-01	6009E-01	9341E-02	5850E-02	8672E-04	1541E-03
7155E+01	2261E-01	5815E-01	8713E-02	5261E-02	1017E-03	1107E-03
7378E+01	2120E-01	5624E-01	8119E-02	4728E-02	1057E-03	7070E-04
7605E+01	1986E-01	5437E-01	7560E-02	4245E-02	1008E-03	3611E-04
7836E+01	1859E-01	5253E-01	7032E-02	3808E-02	8941E-04	8077E-05
8071E+01	1739E-01	5074E-01	6536E-02	3413E-02	7379E-04	1282E-04
8310E+01	1626E-01	4897E-01	6070E-02	3056E-02	5616E-04	2662E-04
8553E+01	1519E-01	4725E-01	5632E-02	2733E-02	3850E-04	3389E-04
8801E+01	1418E-01	4557E-01	5222E-02	2443E-02	2238E-04	3565E-04
9053E+01	1324E-01	4393E-01	4837E-02	2181E-02	8930E-05	3315E-04
9309E+01	1234E-01	4233E-01	4478E-02	1945E-02	1218E-05	2779E-04
9570E+01	1151E-01	4077E-01	4142E-02	1734E-02	7895E-05	2096E-04
9835E+01	1072E-01	3925E-01	3829E-02	1544E-02	1135E-04	1384E-04
10104E+01	9986E-02	3777E-01	3537E-02	1373E-02	1212E-04	7400E-05
10356E+01	9296E-02	3634E-01	3264E-02	1221E-02	1095E-04	2244E-05
10606E+01	8651E-02	3490E-01	3011E-02	1084E-02	9625E-05	1339E-05
10859E+01	8048E-02	3360E-01	2776E-02	9622E-03	5863E-05	3360E-05
11100E+01	7484E-02	3229E-01	2557E-02	8534E-03	3238E-05	4052E-05
11335E+01	6957E-02	3103E-01	2354E-02	7565E-03	1120E-05	3785E-05
11565E+01	6465E-02	2981E-01	2166E-02	6701E-03	3209E-06	2959E-05
11790E+01	6006E-02	2863E-01	1992E-02	5934E-03	1094E-05	1937E-05
12010E+01	5579E-02	2748E-01	1831E-02	5251E-03	1320E-05	9852E-06
12226E+01	5180E-02	2638E-01	1683E-02	4646E-03	1181E-05	2580E-06
12439E+01	4808E-02	2532E-01	1545E-02	4109E-03	8595E-06	1941E-06

2512E+02	4461E-02	2429E-01	1419E-02	3632E-03	4987E-06	3938E-06
2630E+02	4138E-02	2330E-01	1302E-02	3211E-03	1967E-06	4103E-06
2754E+02	3838E-02	2235E-01	1194E-02	2837E-03	9255E-08	3191E-06
2884E+02	3557E-02	2143E-01	1095E-02	2506E-03	1109E-06	1986E-06
3020E+02	3294E-02	2055E-01	1004E-02	2214E-03	1337E-06	8626E-07
3162E+02	3053E-02	1970E-01	9204E-03	1955E-03	1114E-06	8350E-08
3311E+02	2827E-02	1888E-01	8434E-03	1726E-03	6636E-07	3459E-07
3467E+02	2616E-02	1810E-01	7727E-03	1523E-03	2855E-07	4675E-07
3631E+02	2420E-02	1734E-01	7077E-03	1344E-03	4730E-10	3696E-07
3802E+02	2237E-02	1661E-01	6481E-03	1186E-03	1081E-07	2014E-07
3981E+02	2068E-02	1591E-01	5934E-03	1046E-03	1267E-07	7606E-08
4169E+02	1910E-02	1524E-01	5432E-03	9225E-04	1111E-07	9465E-09
4365E+02	1763E-02	1459E-01	4971E-03	8132E-04	1222E-08	2993E-08
4571E+02	1627E-02	1397E-01	4549E-03	7166E-04	1485E-08	2572E-08
4786E+02	1500E-02	1338E-01	4162E-03	6313E-04	2773E-08	1360E-08
5012E+02	1383E-02	1281E-01	3808E-03	5558E-04	5293E-09	4822E-09
5248E+02	1274E-02	1226E-01	3483E-03	4893E-04	1634E-08	4069E-09
5495E+02	1173E-02	1173E-01	3185E-03	4305E-04	5945E-09	2011E-08
5754E+02	1080E-02	1122E-01	2912E-03	3786E-04	1445E-08	8082E-09
6026E+02	9936E-03	1074E-01	2663E-03	3328E-04	1225E-08	8407E-09
6310E+02	9136E-03	1027E-01	2434E-03	2924E-04	1543E-08	5905E-09
6607E+02	8398E-03	9826E-02	2225E-03	2568E-04	3059E-09	8560E-10
6918E+02	7716E-03	9398E-02	2033E-03	2254E-04	1176E-08	1214E-08
7244E+02	7087E-03	8988E-02	1858E-03	1978E-04	2254E-08	8073E-09
7586E+02	6506E-03	8594E-02	1698E-03	1735E-04	7820E-10	1547E-08
7943E+02	5971E-03	8218E-02	1551E-03	1521E-04	3314E-08	1577E-09
8318E+02	5479E-03	7857E-02	1417E-03	1333E-04	9738E-09	2092E-08
8710E+02	5025E-03	7511E-02	1294E-03	1168E-04	1589E-08	4476E-08
9120E+02	4608E-03	7180E-02	1182E-03	1023E-04	9033E-09	5373E-08
9550E+02	4225E-03	6863E-02	1079E-03	8952E-05	8076E-09	9400E-09
1000E+03	3873E-03	6560E-02	9854E-04	7834E-05	8120E-09	3951E-08
1047E+03	3549E-03	6270E-02	8977E-04	6853E-05	4093E-08	2537E-08
1096E+03	3252E-03	5992E-02	8213E-04	5993E-05	9566E-08	1333E-08
1148E+03	2980E-03	5726E-02	7498E-04	5240E-05	1472E-08	1982E-08
1202E+03	2730E-03	5472E-02	6844E-04	4580E-05	4255E-08	5382E-08
1259E+03	2501E-03	5229E-02	6247E-04	4002E-05	1187E-07	1563E-08
1318E+03	2291E-03	4996E-02	5702E-04	3494E-05	4200E-08	3899E-09
1380E+03	2098E-03	4774E-02	5204E-04	3054E-05	6063E-08	2051E-08
1445E+03	1922E-03	4561E-02	4749E-04	2667E-05	8833E-08	2807E-08
1514E+03	1760E-03	4357E-02	4333E-04	2329E-05	6585E-08	2011E-08
1585E+03	1613E-03	4163E-02	3954E-04	2033E-05	7559E-08	1715E-08
1660E+03	1477E-03	3977E-02	3608E-04	1775E-05	5267E-08	1095E-08
1738E+03	1353E-03	3799E-02	3292E-04	1549E-05	2421E-08	1429E-08
1820E+03	1240E-03	3630E-02	3004E-04	1352E-05	4305E-08	1366E-07
1906E+03	1136E-03	3467E-02	2740E-04	1179E-05	4892E-08	9126E-08
1995E+03	1041E-03	3312E-02	2500E-04	1029E-05	8122E-08	6671E-08
2089E+03	9539E-04	3164E-02	2281E-04	8979E-06	6893E-09	1371E-07
2188E+03	8742E-04	3023E-02	2081E-04	7834E-06	3288E-08	5117E-08
2291E+03	8013E-04	2887E-02	1898E-04	6835E-06	6073E-08	8876E-08
2399E+03	7345E-04	2758E-02	1732E-04	5963E-06	3010E-08	4105E-08
2512E+03	6734E-04	2634E-02	1580E-04	5202E-06	3934E-09	9178E-08
2630E+03	6174E-04	2516E-02	1441E-04	4539E-06	1445E-07	1097E-07
2754E+03	5662E-04	2404E-02	1314E-04	3960E-06	8137E-08	3842E-08
2884E+03	5192E-04	2296E-02	1199E-04	3455E-06	5365E-08	2003E-07
3020E+03	4761E-04	2193E-02	1094E-04	3015E-06	3165E-08	2412E-07
3162E+03	4366E-04	2095E-02	9976E-05	2630E-06	2032E-08	1228E-07
3311E+03	4005E-04	2001E-02	9100E-05	2295E-06	1486E-07	2665E-07
3467E+03	3673E-04	1911E-02	8300E-05	2003E-06	1178E-07	4759E-07
3631E+03	3369E-04	1825E-02	7571E-05	1748E-06	2129E-07	8712E-08
3802E+03	3089E-04	1743E-02	6905E-05	1525E-06	5129E-07	2679E-07

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.3981E+03 .2833E-04 .1665E-02 .6299E-05 .1331E-06 .3104E-07 .2129E-08
.4167E+03 .2598E-04 .1590E-02 .5745E-05 .1162E-06 .5575E-08 .1512E-07
.4365E+03 .2382E-04 .1519E-02 .5240E-05 .1014E-06 .2378E-07 .1122E-07
.4571E+03 .2184E-04 .1451E-02 .4779E-05 .8851E-07 .7754E-09 .8476E-08
.4786E+03 .2002E-04 .1386E-02 .4359E-05 .7726E-07 .1258E-07 .1659E-07
.5012E+03 .1835E-04 .1324E-02 .3976E-05 .6743E-07 .2414E-07 .1258E-07
.5248E+03 .1682E-04 .1264E-02 .3626E-05 .5886E-07 .4741E-07 .3986E-08
.5495E+03 .1541E-04 .1207E-02 .3308E-05 .5137E-07 .5629E-07 .7165E-08
.5754E+03 .1412E-04 .1153E-02 .3017E-05 .4484E-07 .2132E-07 .1546E-07
.6026E+03 .1293E-04 .1101E-02 .2752E-05 .3914E-07 .3264E-07 .2701E-07
.6310E+03 .1184E-04 .1052E-02 .2510E-05 .3416E-07 .1159E-08 .2175E-07
.6607E+03 .1085E-04 .1005E-02 .2289E-05 .2981E-07 .9390E-07 .5507E-07
.6918E+03 .9929E-05 .9596E-03 .2088E-05 .2601E-07 .2480E-07 .1651E-07
.7244E+03 .9088E-05 .9165E-03 .1904E-05 .2270E-07 .2972E-07 .5471E-07
.7586E+03 .8316E-05 .8753E-03 .1737E-05 .1930E-07 .2066E-07 .7604E-07
.7943E+03 .7609E-05 .8359E-03 .1584E-05 .1738E-07 .1984E-08 .6358E-10
.8318E+03 .6960E-05 .7984E-03 .1445E-05 .1507E-07 .8549E-08 .7371E-09
.8710E+03 .6366E-05 .7625E-03 .1318E-05 .1315E-07 .2239E-07 .2582E-07
.9120E+03 .5821E-05 .7282E-03 .1202E-05 .1147E-07 .4364E-07 .1404E-07
.9550E+03 .5322E-05 .6955E-03 .1096E-05 .1000E-07 .1920E-07 .6807E-07
.1000E+04 .4865E-05 .6642E-03 .9996E-06 .8726E-08 .3891E-07 .2033E-07

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ALPHA IS 100 SCATTERING INDEX IS 3

BETA	RN1	IN1	RN2	IN2	RN3	IN3
1000E+00	3000E-01	2616E-03	5994E-02	1869E-03	5713E-04	6521E-05
1047E+00	3000E-01	2740E-03	5993E-02	1957E-03	5708E-04	6825E-05
1096E+00	3000E-01	2869E-03	5993E-02	2049E-03	5703E-04	7144E-05
1148E+00	3000E-01	3004E-03	5992E-02	2145E-03	5698E-04	7477E-05
1202E+00	2999E-01	3145E-03	5991E-02	2246E-03	5692E-04	7825E-05
1259E+00	2999E-01	3293E-03	5990E-02	2351E-03	5686E-04	8189E-05
1318E+00	2999E-01	3448E-03	5990E-02	2462E-03	5679E-04	8569E-05
1370E+00	2999E-01	3611E-03	5989E-02	2577E-03	5672E-04	8967E-05
1425E+00	2999E-01	3781E-03	5987E-02	2698E-03	5668E-04	9382E-05
1514E+00	2999E-01	3959E-03	5986E-02	2824E-03	5654E-04	9816E-05
1585E+00	2999E-01	4145E-03	5985E-02	2957E-03	5644E-04	1027E-04
1660E+00	2999E-01	4340E-03	5983E-02	3095E-03	5633E-04	1074E-04
1738E+00	2999E-01	4544E-03	5982E-02	3240E-03	5621E-04	1124E-04
1820E+00	2999E-01	4758E-03	5980E-02	3392E-03	5608E-04	1175E-04
1906E+00	2999E-01	4982E-03	5978E-02	3550E-03	5594E-04	1229E-04
1995E+00	2999E-01	5216E-03	5976E-02	3716E-03	5579E-04	1285E-04
2088E+00	2998E-01	5462E-03	5974E-02	3889E-03	5561E-04	1343E-04
2183E+00	2998E-01	5718E-03	5971E-02	4070E-03	5543E-04	1404E-04
2281E+00	2998E-01	5987E-03	5969E-02	4260E-03	5522E-04	1468E-04
2382E+00	2998E-01	6268E-03	5966E-02	4458E-03	5500E-04	1534E-04
2512E+00	2998E-01	6563E-03	5962E-02	4665E-03	5476E-04	1602E-04
2630E+00	2998E-01	6871E-03	5959E-02	4881E-03	5449E-04	1674E-04
2754E+00	2997E-01	7194E-03	5955E-02	5107E-03	5420E-04	1747E-04
2884E+00	2997E-01	7531E-03	5950E-02	5343E-03	5388E-04	1824E-04
3020E+00	2997E-01	7884E-03	5946E-02	5590E-03	5354E-04	1903E-04
3162E+00	2996E-01	8254E-03	5940E-02	5847E-03	5316E-04	1986E-04
3311E+00	2996E-01	8641E-03	5935E-02	6116E-03	5275E-04	2072E-04
3467E+00	2996E-01	9046E-03	5929E-02	6396E-03	5230E-04	2160E-04
3631E+00	2995E-01	9469E-03	5922E-02	6689E-03	5181E-04	2251E-04
3802E+00	2995E-01	9912E-03	5915E-02	6994E-03	5128E-04	2345E-04
3991E+00	2994E-01	1038E-02	5907E-02	7311E-03	5070E-04	2442E-04
4189E+00	2994E-01	1086E-02	5898E-02	7643E-03	5008E-04	2542E-04
4395E+00	2993E-01	1137E-02	5888E-02	7987E-03	4940E-04	2644E-04
4611E+00	2993E-01	1190E-02	5878E-02	8346E-03	4866E-04	2749E-04
4836E+00	2992E-01	1245E-02	5866E-02	8720E-03	4786E-04	2855E-04
5071E+00	2991E-01	1303E-02	5854E-02	9108E-03	4699E-04	2964E-04
5315E+00	2990E-01	1364E-02	5840E-02	9511E-03	4606E-04	3075E-04
5568E+00	2989E-01	1427E-02	5826E-02	9930E-03	4505E-04	3187E-04
5834E+00	2988E-01	1493E-02	5810E-02	1036E-02	4396E-04	3300E-04
6096E+00	2987E-01	1562E-02	5792E-02	1082E-02	4279E-04	3413E-04
6310E+00	2986E-01	1634E-02	5773E-02	1128E-02	4153E-04	3527E-04
6507E+00	2985E-01	1710E-02	5753E-02	1177E-02	4018E-04	3640E-04
6918E+00	2983E-01	1788E-02	5731E-02	1226E-02	3873E-04	3751E-04
7144E+00	2982E-01	1870E-02	5707E-02	1278E-02	3718E-04	3861E-04
7586E+00	2980E-01	1956E-02	5680E-02	1331E-02	3553E-04	3967E-04
7943E+00	2978E-01	2045E-02	5652E-02	1386E-02	3378E-04	4070E-04
8318E+00	2976E-01	2139E-02	5622E-02	1442E-02	3191E-04	4169E-04
8710E+00	2974E-01	2236E-02	5589E-02	1500E-02	2994E-04	4261E-04
9120E+00	2971E-01	2337E-02	5553E-02	1560E-02	2786E-04	4347E-04
9556E+00	2969E-01	2442E-02	5515E-02	1620E-02	2566E-04	4425E-04
1000E+01	2966E-01	2552E-02	5474E-02	1683E-02	2336E-04	4493E-04
1047E+01	2962E-01	2666E-02	5430E-02	1746E-02	2096E-04	4549E-04
1096E+01	2959E-01	2785E-02	5382E-02	1811E-02	1845E-04	4594E-04
1148E+01	2955E-01	2908E-02	5332E-02	1876E-02	1586E-04	4626E-04
1202E+01	2951E-01	3037E-02	5278E-02	1943E-02	1318E-04	4642E-04
1259E+01	2947E-01	3170E-02	5220E-02	2010E-02	1042E-04	4640E-04
1318E+01	2942E-01	3308E-02	5158E-02	2077E-02	7610E-05	4622E-04
1370E+01	2937E-01	3451E-02	5093E-02	2145E-02	4751E-05	4583E-04
1425E+01	2931E-01	3599E-02	5023E-02	2213E-02	1865E-05	4524E-04
1514E+01	2925E-01	3753E-02	4949E-02	2281E-02	1028E-05	4443E-04

1535E+01	9992E-02	2631E-03	2991E-03	1839E-04	9391E-11	6926E-11
1660E+01	9992E-02	2755E-03	2990E-03	1926E-04	9174E-11	7199E-11
1738E+01	9991E-02	2985E-03	2989E-03	2016E-04	8940E-11	7480E-11
1920E+01	9990E-02	3020E-03	2988E-03	2110E-04	8683E-11	7764E-11
1905E+01	9989E-02	3162E-03	2987E-03	2209E-04	8406E-11	8052E-11
1995E+01	9988E-02	3311E-03	2986E-03	2313E-04	8105E-11	8343E-11
2039E+01	9987E-02	3466E-03	2984E-03	2421E-04	7778E-11	8635E-11
2188E+01	9986E-02	3629E-03	2983E-03	2534E-04	7424E-11	8926E-11
2391E+01	9984E-02	3800E-03	2981E-03	2652E-04	7043E-11	9216E-11
2399E+01	9983E-02	3978E-03	2979E-03	2776E-04	6630E-11	9501E-11
2512E+01	9981E-02	4165E-03	2977E-03	2905E-04	6186E-11	9780E-11
2630E+01	9979E-02	4360E-03	2975E-03	3041E-04	5709E-11	1005E-10
2754E+01	9977E-02	4565E-03	2973E-03	3182E-04	5196E-11	1030E-10
2884E+01	9975E-02	4778E-03	2970E-03	3330E-04	4647E-11	1054E-10
3020E+01	9973E-02	5003E-03	2967E-03	3484E-04	4059E-11	1076E-10
3162E+01	9970E-02	5254E-03	2964E-03	3645E-04	3433E-11	1095E-10
3311E+01	9967E-02	5481E-03	2961E-03	3814E-04	2769E-11	1112E-10
3478E+01	9964E-02	5738E-03	2957E-03	3990E-04	2067E-11	1124E-10
3631E+01	9961E-02	6006E-03	2953E-03	4174E-04	1326E-11	1132E-10
3802E+01	9957E-02	6286E-03	2949E-03	4365E-04	5480E-12	1136E-10
3991E+01	9953E-02	6579E-03	2944E-03	4565E-04	2649E-12	1138E-10
4199E+01	9948E-02	6885E-03	2938E-03	4774E-04	1109E-11	1124E-10
4365E+01	9943E-02	7206E-03	2932E-03	4992E-04	1979E-11	1108E-10
4571E+01	9938E-02	7540E-03	2926E-03	5218E-04	2869E-11	1084E-10
4736E+01	9932E-02	7890E-03	2919E-03	5455E-04	3771E-11	1051E-10
5002E+01	9925E-02	8256E-03	2911E-03	5701E-04	4678E-11	1008E-10
5248E+01	9916E-02	8638E-03	2903E-03	5956E-04	5574E-11	9548E-11
5495E+01	9910E-02	9036E-03	2894E-03	6223E-04	6448E-11	8905E-11
5754E+01	9902E-02	9453E-03	2884E-03	6499E-04	7284E-11	8143E-11
6026E+01	9893E-02	9887E-03	2873E-03	6786E-04	8063E-11	7263E-11
6310E+01	9882E-02	1034E-02	2861E-03	7085E-04	8763E-11	6264E-11
6607E+01	9871E-02	1081E-02	2848E-03	7394E-04	9363E-11	5148E-11
6915E+01	9859E-02	1131E-02	2834E-03	7714E-04	9838E-11	3923E-11
7244E+01	9846E-02	1182E-02	2819E-03	8045E-04	1016E-10	2601E-11
7584E+01	9831E-02	1236E-02	2802E-03	8387E-04	1031E-10	1196E-11
7946E+01	9815E-02	1292E-02	2784E-03	8741E-04	1026E-10	2613E-12
8318E+01	9798E-02	1350E-02	2765E-03	9105E-04	9982E-11	1742E-11
8710E+01	9779E-02	1410E-02	2743E-03	9480E-04	9467E-11	3212E-11
9120E+01	9758E-02	1473E-02	2720E-03	9865E-04	8698E-11	4619E-11
9550E+01	9736E-02	1538E-02	2695E-03	1026E-03	7674E-11	5916E-11
1000E+02	9711E-02	1606E-02	2668E-03	1066E-03	6405E-11	7042E-11
1047E+02	9685E-02	1676E-02	2638E-03	1108E-03	4914E-11	7940E-11
1096E+02	9658E-02	1749E-02	2607E-03	1150E-03	3237E-11	8551E-11
1148E+02	9624E-02	1825E-02	2572E-03	1193E-03	1435E-11	8820E-11
1203E+02	9590E-02	1903E-02	2536E-03	1236E-03	4205E-12	8706E-11
1279E+02	9552E-02	1984E-02	2496E-03	1280E-03	2239E-11	8184E-11
1319E+02	9512E-02	2067E-02	2454E-03	1323E-03	3919E-11	7248E-11
1383E+02	9468E-02	2153E-02	2408E-03	1367E-03	5346E-11	5928E-11
1445E+02	9421E-02	2241E-02	2359E-03	1411E-03	6417E-11	4279E-11
1514E+02	9369E-02	2332E-02	2308E-03	1455E-03	7032E-11	2399E-11
1585E+02	9314E-02	2425E-02	2252E-03	1498E-03	7125E-11	4139E-12
1660E+02	9254E-02	2521E-02	2194E-03	1540E-03	6660E-11	1517E-11
1738E+02	9189E-02	2618E-02	2132E-03	1581E-03	5661E-11	3229E-11
1820E+02	9120E-02	2718E-02	2066E-03	1620E-03	4205E-11	4548E-11
1907E+02	9045E-02	2819E-02	1997E-03	1658E-03	2428E-11	5338E-11
1995E+02	8965E-02	2922E-02	1925E-03	1693E-03	5203E-12	5503E-11
2099E+02	8879E-02	3028E-02	1849E-03	1726E-03	1293E-11	5022E-11
2188E+02	8787E-02	3131E-02	1770E-03	1756E-03	2785E-11	3963E-11
2391E+02	8690E-02	3237E-02	1688E-03	1783E-03	3758E-11	2477E-11
2579E+02	8585E-02	3343E-02	1602E-03	1807E-03	4083E-11	7962E-12

1585E+01	2919E-01	3911E-02	4871E-02	2349E-02	3907E-05	4340E-04
1660E+01	2911E-01	4075E-02	4789E-02	2416E-02	6747E-05	4213E-04
1738E+01	2904E-01	4244E-02	4702E-02	2482E-02	9521E-05	4063E-04
1820E+01	2896E-01	4419E-02	4611E-02	2547E-02	1220E-04	3888E-04
1905E+01	2887E-01	4598E-02	4516E-02	2610E-02	1476E-04	3690E-04
1995E+01	2877E-01	4783E-02	4416E-02	2671E-02	1716E-04	3469E-04
2089E+01	2867E-01	4973E-02	4312E-02	2730E-02	1938E-04	3226E-04
2188E+01	2856E-01	5168E-02	4204E-02	2787E-02	2139E-04	2962E-04
2291E+01	2844E-01	5367E-02	4092E-02	2841E-02	2315E-04	2680E-04
2399E+01	2831E-01	5571E-02	3975E-02	2891E-02	2464E-04	2381E-04
2512E+01	2818E-01	5780E-02	3859E-02	2938E-02	2583E-04	2070E-04
2630E+01	2803E-01	5992E-02	3731E-02	2981E-02	2671E-04	1748E-04
2754E+01	2788E-01	6209E-02	3604E-02	3020E-02	2724E-04	1421E-04
2884E+01	2772E-01	6429E-02	3474E-02	3055E-02	2742E-04	1091E-04
3020E+01	2754E-01	6653E-02	3341E-02	3085E-02	2725E-04	7647E-05
3162E+01	2736E-01	6879E-02	3205E-02	3110E-02	2672E-04	4452E-05
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3802E+01	2651E-01	7803E-02	2647E-02	3155E-02	2123E-04	6644E-05
3981E+01	2627E-01	8037E-02	2505E-02	3152E-02	1916E-04	8772E-05
4169E+01	2601E-01	8270E-02	2363E-02	3144E-02	1687E-04	1056E-04
4365E+01	2575E-01	8502E-02	2222E-02	3129E-02	1443E-04	1199E-04
4571E+01	2547E-01	8733E-02	2082E-02	3109E-02	1189E-04	1304E-04
4786E+01	2518E-01	8962E-02	1943E-02	3083E-02	9302E-05	1369E-04
5012E+01	2487E-01	9188E-02	1805E-02	3051E-02	6739E-05	1395E-04
5248E+01	2456E-01	9411E-02	1671E-02	3013E-02	4259E-05	1382E-04
5495E+01	2423E-01	9629E-02	1538E-02	2971E-02	1922E-05	1332E-04
5754E+01	2389E-01	9843E-02	1409E-02	2923E-02	2161E-06	1250E-04
6026E+01	2353E-01	1005E-01	1283E-02	2870E-02	2105E-05	1139E-04
6310E+01	2317E-01	1025E-01	1161E-02	2813E-02	3702E-05	1004E-04
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8318E+01	2075E-01	1129E-01	5249E-03	2392E-02	6244E-05	4754E-06
8710E+01	2032E-01	1143E-01	4365E-03	2312E-02	5615E-05	7679E-06
9120E+01	1987E-01	1156E-01	3535E-03	2231E-02	4795E-05	1776E-05
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1096E+02	1804E-01	1195E-01	7562E-04	1896E-02	8666E-06	3161E-05
1148E+02	1756E-01	1201E-01	1937E-04	1812E-02	3047E-07	2907E-05
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2089E+02	1144E-01	1167E-01	3158E-03	8534E-03	3743E-06	1795E-06
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2399E+02	1013E-01	1130E-01	3186E-03	6892E-03	1534E-06	1750E-06

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3981E+02	6057E-02	9351E-02	2367E-03	2812E-03	1016E-07	9463E-08
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4786E+02	4899E-02	8509E-02	1955E-03	1948E-03	2818E-08	1575E-08
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5495E+02	4144E-02	7867E-02	1659E-03	1461E-03	8425E-09	1803E-09
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9550E+02	1986E-02	5437E-02	7560E-04	4245E-04	4504E-10	1456E-09
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1380E+03	1151E-02	4077E-02	4142E-04	1734E-04	2613E-10	1326E-10
1445E+03	1072E-02	3925E-02	3829E-04	1544E-04	1470E-09	1186E-09
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1585E+03	9296E-03	3634E-02	3264E-04	1221E-04	4491E-10	7712E-10
1660E+03	8651E-03	3495E-02	3011E-04	1084E-04	8073E-10	2127E-09
1738E+03	8048E-03	3360E-02	2776E-04	9622E-05	2071E-09	1371E-09
1820E+03	7484E-03	3229E-02	2557E-04	8534E-05	1271E-10	5801E-10
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1995E+03	6465E-03	2981E-02	2166E-04	6701E-05	1503E-09	2842E-09
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2291E+03	5180E-03	2638E-02	1683E-04	4646E-05	1152E-09	8221E-10
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2884E+03	3557E-03	2143E-02	1095E-04	2506E-05	6566E-10	3854E-10
3020E+03	3296E-03	2055E-02	1004E-04	2214E-05	2922E-10	1913E-09
3162E+03	3053E-03	1970E-02	9204E-05	1955E-05	1172E-09	2349E-09
3311E+03	2827E-03	1888E-02	8434E-05	1726E-05	7194E-10	2559E-09
3467E+03	2616E-03	1810E-02	7727E-05	1523E-05	1480E-09	1305E-09
3631E+03	2420E-03	1734E-02	7077E-05	1344E-05	5921E-09	3271E-09
3802E+03	2237E-03	1661E-02	6481E-05	1186E-05	2114E-09	3500E-09

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4365E+03 1763E-03- 1459E-02- 4971E-05- 8132E-06 5520E-09 1594E-09
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4786E+03 1500E-03- 1338E-02- 4162E-05- 6313E-06- 1381E-09- 1827E-09
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5248E+03 1274E-03- 1226E-02- 3483E-05- 4893E-06 1377E-09- 2857E-09
5495E+03 1173E-03- 1173E-02- 3185E-05- 4305E-06 8279E-09- 7246E-09
5754E+03 1080E-03- 1122E-02- 2912E-05- 3786E-06 3664E-09- 5010E-09
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6310E+03 9136E-04- 1027E-02- 2434E-05- 2924E-06 4202E-10- 6540E-10
6607E+03 8398E-04- 9826E-03- 2225E-05- 2568E-06 2908E-09- 5428E-09
6918E+03 7716E-04- 9398E-03- 2033E-05- 2254E-06 2310E-09- 5476E-09
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7586E+03 6506E-04- 8594E-03- 1698E-05- 1735E-06- 2958E-09 6929E-09
7943E+03 5971E-04- 8218E-03- 1551E-05- 1521E-06 5579E-09 1136E-08
8318E+03 5479E-04- 7857E-03- 1417E-05- 1333E-06 7895E-09- 7188E-09
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9120E+03 4608E-04- 7180E-03- 1182E-05- 1023E-06 8776E-09- 3105E-10
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1000E+04 3873E-04- 6560E-03- 9854E-06- 7834E-07 1042E-08 2665E-09

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APPENDIX C

ERROR ANALYSIS OF NUMERICAL INTEGRATION

The residual error in the results of the numerical integration was determined to insure the accuracy of the transport coefficients. This error can arise from several sources including the input data, range truncation, round off, or the quadrature technique. It was determined that the error is negligible.

Possible input errors could arise from the approximations used in evaluating the exponential integrals including the neglect of higher order terms in the asymptotic and small value expansions as well as the polynomial equations used for real arguments. These errors are less than one part in a million which is much less than the accuracy required for the transport coefficients.

Range truncation and round off are also negligible sources of error. Truncation of the range was only necessary in trapezoidal quadrature. The integrand was oscillatory with exponentially decreasing amplitude, thus it was possible to lower the upper limit of the integral with negligible error resulting.

The error due to the two quadrature techniques used in evaluation of the parametric integrals can be estimated as:

$$R_{GL} = f^{(34)}(\epsilon)/2,3336E-9 \quad 0 < \epsilon < \infty \quad (C1)$$

$$R_T = f^2(\epsilon) \times (b-a)^2 / (12I^2) \quad a < \epsilon < b \quad (C2)$$

where R_{GL} is the residual error from Gaussian-Laguerre quadrature, R_T is the residual error from trapezoidal quadrature, f is the integrand function, a & b are integral limits, and I is the number of grid points. Because the integrand functions are very complicated, exact values for these errors can not be determined. However order of magnitude bounds can be established for all integrands. The 34th derivatives of the integrands integrated using Gaussian-Laguerre quadrature have upper bounds of one, thus the residual error is less than one part in a billion. The second derivative of the integrand functions integrated using trapezoidal quadrature have an upper bound of 10^{-2} . Thus the residual error is of the order of one part in a hundred thousand for 150 grid points and a range of 0 to 0.75. The convergence to five places was also verified by varying the number and spacing of the grid points.

In conclusion it can be said that the values quoted in Appendix B are certainly accurate to the number of digits reported.

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