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Electron-Electron Interaction
from Single-Electron Theory

UNITED STATES
ATOMIC ENERGY COMMISSION
CONTRACT W-7405-ENG. 36

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Printed in the United States of America. Available from
Clearinghouse for Federal Scientific and Technical Information
National Bureau of Standards, U. S. Department of Commerce
Springfield, Virginia 22151

Price: Printed Copy \$3.00; Microfiche \$0.65

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Report written: March 1968

Report distributed: July 24, 1968

**Electron-Electron Interaction
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by

Walter F. Huebner

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ELECTRON-ELECTRON INTERACTION FROM SINGLE-ELECTRON THEORY

by

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ABSTRACT

Electron-electron Coulomb interaction energies are expressed in terms of relativistic one-electron orbitals. The $F^{(0)}$ Slater integrals are tabulated using hydrogenic Dirac wave functions for $Z = 1, 30, 56, 74,$ and 92 . The average electron-electron interaction energy, τ , is obtained and tabulated for the same values of Z , for electron configurations in j - j coupling, from relativistic $F^{(0)}$ and nonrelativistic $G^{(k)}$ integrals, with $k \leq 6$. Interpolation formulas are given to obtain τ at other values of Z . An approximate method is proposed for obtaining binding energies for the electrons in ions in their ground state, and for ions and neutral atoms in excited states, from known binding energy data of neutral atoms corrected by the electron-electron interaction energy.

I. INTRODUCTION

The nonrelativistic many-electron atom can be represented by the Schrödinger equation

$$(H - E) \Psi = 0. \quad (1)$$

Neglecting all except the electrostatic interactions, the Hamiltonian for an N -electron atom (N bound electrons in case of an ion) in Rydberg units* is

$$H = - \sum_{i=1}^N \left(\nabla_i^2 + \frac{2Z}{r_i} \right) + \sum_{i=1}^{j-1} \sum_{j=1}^N \frac{2}{r_{ij}}. \quad (2)$$

The usual approximations associated with an infinitely heavy nucleus have been made. The last term in Eq. (2) is a double summation over the Coulomb interactions between pairs of electrons and

its contribution to the energy E is the object of the calculations to be carried out here. For the wave function Ψ of the atom (ion) one can write an antisymmetric function in the form of a determinant

$$\Psi = \frac{1}{\sqrt{N!}} \begin{vmatrix} \psi_1(1) & \psi_1(2) & \dots & \psi_1(N) \\ \psi_2(1) & \psi_2(2) & \dots & \psi_2(N) \\ \dots & \dots & \dots & \dots \\ \psi_N(1) & \psi_N(2) & \dots & \psi_N(N) \end{vmatrix}. \quad (3)$$

The subscript on ψ is a short notation of all quantum numbers associated with the specifically numbered state in which an electron is, the number in parentheses indicates the coordinates of the specifically numbered electron. Since the Pauli exclusion principle allows only one electron per state, it will suffice in the following to retain the electron state and drop the electron (coordinate)

* Unit of length is the first Bohr radius $a_0 = \hbar^2 / (me^2)$ and the unit of energy is $Rhc = me^4 / (2\hbar^2)$.

identification, except in the cases of two-electron interaction terms, where the coordinates of the two electrons will simply be identified by 1 and 2, since there they are only dummy indices. The expectation value of the Hamiltonian is

$$\begin{aligned} \int \cdots \int \Psi^* H \Psi \, dv_1 \cdots dv_N = & - \sum_{i=1}^N \int \Psi_i^* \left(\nabla^2 + \frac{2Z}{r} \right) \Psi_i \, dv \\ & + \sum_{i=1}^{j-1} \sum_{j=1}^N \iint \left[\Psi_i^*(1) \Psi_j^*(2) \frac{2}{r_{12}} \Psi_i(1) \Psi_j(2) \right. \\ & \left. - \Psi_i^*(1) \Psi_j^*(2) \frac{2}{r_{12}} \Psi_i(2) \Psi_j(1) \right] dv_1 dv_2, \quad (4) \end{aligned}$$

where the dv are differentials of volume. Since there are $N!$ identical terms, the factor $(N!)^{-1}$ cancels.¹ Equation (4) can be connected to particular one-electron wave functions and Hamiltonians by

$$\begin{aligned} \int \Psi_i^* H_1 \Psi_i \, dv = & - \int \Psi_i^* \left(\nabla^2 + \frac{2Z}{r} \right) \Psi_i \, dv \\ & + \sum_{j=1}^N \iint \left[\Psi_i^*(1) \Psi_j^*(2) \frac{2}{r_{12}} \Psi_i(1) \Psi_j(2) \right. \\ & \left. - \Psi_i^*(1) \Psi_j^*(2) \frac{2}{r_{12}} \Psi_i(2) \Psi_j(1) \right] dv_1 dv_2, \quad (5) \end{aligned}$$

In this summation the term $i = j$ does not contribute. The terms in the summation are the two-electron corrections to the one-electron Schrödinger equation. It is common procedure to identify the terms of Eq. (5) by writing

$$\int \Psi_i^* H_1 \Psi_i \, dv = I_i + \sum_{j=1}^N (J_{ij} - K_{ij}), \quad (5')$$

where I_i is the electron-nucleus interaction energy, J_{ij} the direct integral, and K_{ij} the exchange integral of the Coulomb interaction. When $i = j$

$$J_{ii} = K_{ii}, \quad (6)$$

and either both terms may be included or neglected in Eqs. (5) and (5'). From the orthogonality of the spin wave functions it follows that the exchange integral K_{ij} will be zero unless Ψ_i and Ψ_j have the same spin. The usual procedure of solving Eq. (5) is to compute wave functions by a method of

successive approximations until the potentials, i.e., the electron-nucleus and electron-electron interactions, are self-consistent to a high degree of accuracy.^{2,3} It is immediately clear that this leads to extensive calculations involving wave functions which are different for each electronic configuration. The procedure to be followed here shall instead use hydrogenic wave functions and employ only one iteration on a perturbation procedure to obtain an approximate energy E_1 for state 1. This procedure yields a set of electron-electron interaction energies τ_{ij} , which, similar to electron-electron screening constants, will be independent of electronic configurations.

II. MATRIX COMPONENTS OF THE HAMILTONIAN FOR A CENTRAL FIELD USING HYDROGENIC DIRAC WAVE FUNCTIONS

A. Calculation of the electron-nucleus interaction energy.

The term I_1 of Eq. (5') using Dirac wave functions without external field, and expressed in Rydberg units, is

$$I_1 = - \int \Psi_1^\dagger \left(\frac{2Z}{r} - \beta \frac{2}{\alpha^2} - \frac{2}{\alpha} \vec{\alpha} \cdot \vec{p} \right) \Psi_1 \, dv - \frac{2}{\alpha^2}. \quad (7)$$

Here Ψ_1 is a 4-spinor for an electron in state 1

$$\Psi_1 = \begin{pmatrix} \psi_1^{(1)} \\ \psi_1^{(2)} \\ \psi_1^{(3)} \\ \psi_1^{(4)} \end{pmatrix}, \quad \Psi_1^\dagger = (\psi_1^{(1)*} \psi_1^{(2)*} \psi_1^{(3)*} \psi_1^{(4)*}), \quad (8)$$

$\vec{\alpha}$, and β are the Dirac matrices

$$\alpha_x = \begin{pmatrix} 0 & 0 & 0 & 1 \\ 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 \\ 1 & 0 & 0 & 0 \end{pmatrix}, \quad \alpha_y = \begin{pmatrix} 0 & 0 & 0 & -i \\ 0 & 0 & i & 0 \\ 0 & -i & 0 & 0 \\ i & 0 & 0 & 0 \end{pmatrix}, \quad (9)$$

$$\alpha_z = \begin{pmatrix} 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & -1 \\ 1 & 0 & 0 & 0 \\ 0 & -1 & 0 & 0 \end{pmatrix}, \quad \beta = \begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & -1 & 0 \\ 0 & 0 & 0 & -1 \end{pmatrix},$$

$2/\alpha^2$ is the rest mass energy of an electron in Rydberg units, α is the fine structure constant,

and the momentum operator is

$$\vec{p} = -i \vec{\nabla}, \quad (10)$$

with the radius of the first Bohr orbit as the unit of length for the gradient in Eq. (10).

Using hydrogenic wave functions ϕ_1 , the solution of Eq. (7) is⁴

$$I_1^{(0)} = \left\{ 1 + \frac{(\alpha Z)^2}{\left[n - j - \frac{1}{2} + \sqrt{(j + \frac{1}{2})^2 - (\alpha Z)^2} \right]^2} \right\}^{-\frac{1}{2}} - \frac{2}{\alpha^2}. \quad (11)$$

Here n is the principal quantum number[†] and $j = l + \frac{1}{2}$ as specified by state 1. Expanding in ascending powers of $(\alpha Z)^2$, one obtains

$$I_1^{(0)} = -\frac{Z^2}{n^2} \left[1 + \frac{(\alpha Z)^2}{n} \left(\frac{1}{j + \frac{1}{2}} - \frac{3}{4n} \right) + \dots \right]. \quad (12)$$

Setting

$$\psi_1 = \phi_1 + \Delta \phi_1 \quad (13)$$

and

$$E_1 = I_1^{(0)} + \Delta E_1, \quad (14)$$

one obtains by use of perturbation theory and the aid of Green's theorem from

$$\int \phi_1^\dagger \left(I_1^{(0)} + \frac{2}{\alpha^2} + \frac{2Z}{r} - \beta \frac{2}{\alpha^2} - \frac{2}{\alpha} \vec{\alpha} \cdot \vec{p} \right) \phi_1 dv = 0 \quad (7')$$

and

$$\begin{aligned} \int \psi_1^\dagger \left(E_1 + \frac{2}{\alpha^2} + \frac{2Z}{r} - \beta \frac{2}{\alpha^2} - \frac{2}{\alpha} \vec{\alpha} \cdot \vec{p} \right) \psi_1 dv \\ = \sum_{j=1}^N (J_{1j}^{(0)} - K_{1j}^{(0)}), \end{aligned} \quad (5'')$$

the first iteration energy correction

$$\Delta E_1 \approx \sum_{j=1}^N (J_{1j}^{(0)} - K_{1j}^{(0)}). \quad (15)$$

Here

$$J_{1j}^{(0)} = \iint \phi_1^\dagger(1) \phi_j^\dagger(2) \frac{2}{r_{12}} \phi_1'(1) \phi_j(2) dv_1 dv_2, \quad (16)$$

and

$$K_{1j}^{(0)} = \iint \phi_1^\dagger(1) \phi_j^\dagger(1) \frac{2}{r_{12}} \phi_1(2) \phi_j(2) dv_1 dv_2, \quad (17)$$

[†] The subscript j and the quantum number j are not easily confused.

with ϕ_1 and ϕ_j hydrogenic Dirac wave functions.

B. Calculation of the direct integral.

The factor $1/r_{12}$ occurs in both the direct integral and the exchange integral. This term can be expanded in terms of the coordinates r_1, θ_1, φ_1 and r_2, θ_2, φ_2 of the two electrons with the nucleus at the origin of the coordinate system, as indicated in Fig. 1:

$$\frac{1}{r_{12}} = \sum_{k=0}^{\infty} \sum_{m'=-k}^k \frac{4\pi}{2k+1} \frac{r_{<}^k}{r_{>}^{k+1}} Y_{k,m'}^*(1) Y_{k,m'}(2). \quad (18)$$

In this equation $r_{<}$ stands for the smaller of r_1 or r_2 , and conversely $r_{>}$ stands for the larger of r_1 or r_2 . The normalized spherical harmonic shall be defined by (see appendix of Ref. (4)).

$$\begin{aligned} Y_{k,m'}(2) &\equiv Y_{k,m'}(\theta_2, \varphi_2) \\ &= \sqrt{\frac{(2k+1) \cdot (k-m')!}{4\pi \cdot (k+m')!}} P_k^{m'}(\cos \theta_2) e^{im'\varphi_2}, \end{aligned} \quad (19)$$

where $P_k^{m'}(\cos \theta)$ is the unnormalized associated Legendre polynomial, and

$$Y_{k,m'}^*(1) \equiv Y_{k,m'}^*(\theta_1, \varphi_1) = (-1)^{m'} Y_{k,-m'}(\theta_1, \varphi_1), \quad (20)$$

and

$$P_k^{-m'}(\cos \theta) = \frac{(k-m')!}{(k+m')!} P_k^{m'}(\cos \theta). \quad (21)$$

The hydrogenic Dirac wave functions are⁴ for $j = l + 1/2$

$$\phi^{(1)} = g(r) \sqrt{\frac{l+m+\frac{1}{2}}{2l+1}} Y_{l,m-\frac{1}{2}}(\theta, \varphi),$$

$$\phi^{(2)} = -g(r) \sqrt{\frac{l-m+\frac{1}{2}}{2l+1}} Y_{l,m+\frac{1}{2}}(\theta, \varphi),$$

$$\phi^{(3)} = -if(r) \sqrt{\frac{l-m+\frac{3}{2}}{2l+3}} Y_{l+1,m-\frac{1}{2}}(\theta, \varphi),$$

$$\phi^{(4)} = -if(r) \sqrt{\frac{l+m+\frac{3}{2}}{2l+3}} Y_{l+1,m+\frac{1}{2}}(\theta, \varphi), \quad (22a)$$

and for $j = l - 1/2$

$$\phi^{(1)} = g(r) \sqrt{\frac{l-m+\frac{1}{2}}{2l+1}} Y_{l,m-\frac{1}{2}}(\theta, \varphi),$$

$$\phi^{(2)} = g(r) \sqrt{\frac{l+m+\frac{1}{2}}{2l+1}} Y_{l,m+\frac{1}{2}}(\theta, \varphi),$$

$$\phi^{(3)} = -if(r) \sqrt{\frac{l+m-\frac{1}{2}}{2l-1}} Y_{l-1,m-\frac{1}{2}}(\theta, \varphi),$$

$$\phi^{(4)} = if(r) \sqrt{\frac{l-m-\frac{1}{2}}{2l-1}} Y_{l-1,m+\frac{1}{2}}(\theta, \varphi). \quad (22b)$$

The functions $g(r)$ and $f(r)$ in Eqs. (22a) and (22b) are, respectively, the large and the small component of the Dirac wave function, and $m \equiv -j, -j+1, \dots, j-1, j$.

The direct integral, Eq. (16), can now be expressed in detail, first for the case[†] $j = l + 1/2$, $j' = l' + 1/2$

$$\begin{aligned} J_{ij}^{(0)} = & 2 \iint \left\{ g_1^2(1) \left[\frac{l+m+\frac{1}{2}}{2l+1} Y_{l,m-\frac{1}{2}}^*(1) Y_{l,m-\frac{1}{2}}(1) \right. \right. \\ & \left. \left. + \frac{l-m+\frac{1}{2}}{2l+1} Y_{l,m+\frac{1}{2}}^*(1) Y_{l,m+\frac{1}{2}}(1) \right] \right. \\ & \left. + f_1^2(1) \left[\frac{l-m+\frac{3}{2}}{2l+3} Y_{l+1,m-\frac{1}{2}}^*(1) Y_{l+1,m-\frac{1}{2}}(1) \right. \right. \\ & \left. \left. + \frac{l+m+\frac{3}{2}}{2l+3} Y_{l+1,m+\frac{1}{2}}^*(1) Y_{l+1,m+\frac{1}{2}}(1) \right] \right\} \\ & \times \left\{ g_j^2(2) \left[\frac{l'+m'+\frac{1}{2}}{2l'+1} Y_{l',m'-\frac{1}{2}}^*(2) Y_{l',m'-\frac{1}{2}}(2) \right. \right. \\ & \left. \left. + \frac{l'-m'+\frac{1}{2}}{2l'+1} Y_{l',m'+\frac{1}{2}}^*(2) Y_{l',m'+\frac{1}{2}}(2) \right] \right. \\ & \left. + f_j^2(2) \left[\frac{l'-m'+\frac{3}{2}}{2l'+3} Y_{l'+1,m'-\frac{1}{2}}^*(2) Y_{l'+1,m'-\frac{1}{2}}(2) \right. \right. \\ & \left. \left. + \frac{l'+m'+\frac{3}{2}}{2l'+3} Y_{l'+1,m'+\frac{1}{2}}^*(2) Y_{l'+1,m'+\frac{1}{2}}(2) \right] \right\} \\ & \times \sum_{k=0}^{\infty} \sum_{m''=-k}^k \frac{4\pi}{2k+1} \frac{r_1^k}{r_2^{k+1}} Y_{k,m''}^*(1) Y_{k,m''}(2) \\ & \times r_1^2 \sin \theta_1 dr_1 d\theta_1 d\varphi_1 r_2^2 \sin \theta_2 dr_2 d\theta_2 d\varphi_2. \end{aligned} \quad (23)$$

The integrations over angles θ_1 and φ_1 (dropping the subscript) give

[†]In the following the shorter notation n, l, j, m and n', l', j', m' shall be used instead of n_1, l_1, j_1, m_1 for state 1 and n_j, l_j, j_j, m_j for state j , respectively.

$$\begin{aligned} & \sqrt{\frac{4\pi}{2k+1}} \int_0^\pi \int_0^{2\pi} Y_{l,m-\frac{1}{2}}^* Y_{l,m-\frac{1}{2}} Y_{k,m''}^* d\varphi \sin \theta d\theta \\ & = \frac{2l+1}{4\pi} \frac{(l-m+\frac{1}{2})!}{(l+m-\frac{1}{2})!} \left[\frac{(k-m'')!}{(k+m'')!} \right]^{\frac{1}{2}} \int_0^{2\pi} e^{-im''\varphi} d\varphi \\ & \times \int_0^\pi \left[P_l^{m-\frac{1}{2}}(\cos \theta) \right]^2 P_k^{m''}(\cos \theta) \sin \theta d\theta \\ & = \frac{2l+1}{2} \frac{(l-m+\frac{1}{2})!}{(l+m-\frac{1}{2})!} \int_0^\pi \left[P_l^{m-\frac{1}{2}}(\cos \theta) \right]^2 P_k^{m''}(\cos \theta) \sin \theta d\theta \\ & \equiv c^{(k)}(l, m-\frac{1}{2}; l, m-\frac{1}{2}). \end{aligned} \quad (24a)$$

The integral over φ is zero, unless $m'' = 0$. The coefficients $c^{(k)}$ are tabulated^{1,5} up to values of $l = 3$ (f -electrons) and all corresponding values of m . The remaining angular integrations are similarly

$$\begin{aligned} & \sqrt{\frac{4\pi}{2k+1}} \int_0^\pi \int_0^{2\pi} Y_{l,m+\frac{1}{2}}^* Y_{l,m+\frac{1}{2}} Y_{k,m''}^* d\varphi \sin \theta d\theta \\ & \equiv c^{(k)}(l, m+\frac{1}{2}; l, m+\frac{1}{2}), \end{aligned} \quad (24b)$$

$$\begin{aligned} & \sqrt{\frac{4\pi}{2k+1}} \int_0^\pi \int_0^{2\pi} Y_{l+1,m-\frac{1}{2}}^* Y_{l+1,m-\frac{1}{2}} Y_{k,m''}^* d\varphi \sin \theta d\theta \\ & \equiv c^{(k)}(l+1, m-\frac{1}{2}; l+1, m-\frac{1}{2}), \end{aligned} \quad (24c)$$

$$\begin{aligned} & \sqrt{\frac{4\pi}{2k+1}} \int_0^\pi \int_0^{2\pi} Y_{l+1,m+\frac{1}{2}}^* Y_{l+1,m+\frac{1}{2}} Y_{k,m''}^* d\varphi \sin \theta d\theta \\ & \equiv c^{(k)}(l+1, m+\frac{1}{2}; l+1, m+\frac{1}{2}). \end{aligned} \quad (24d)$$

Integrations over angles θ_2 and φ_2 give the same results as Eqs. (24a) to (24d). The highest value of k for which $c^{(k)}$ is not zero is $2l$. Substitution of Eqs. (24a) to (24d) into Eq. (23) yields

$$\begin{aligned} J_{ij}^{(0)} = & 2 \sum_K \iint \left\{ g_1^2(1) \left[(l+m+\frac{1}{2}) c^{(k)}(l, m-\frac{1}{2}; l, m-\frac{1}{2}) \right. \right. \\ & \left. \left. + (l-m+\frac{1}{2}) c^{(k)}(l, m+\frac{1}{2}; l, m+\frac{1}{2}) \right] \right. \\ & \left. + \frac{f_1^2(1)}{2l+3} \left[(l-m+\frac{3}{2}) c^{(k)}(l+1, m-\frac{1}{2}; l+1, m-\frac{1}{2}) \right. \right. \\ & \left. \left. + (l+m+\frac{3}{2}) c^{(k)}(l+1, m+\frac{1}{2}; l+1, m+\frac{1}{2}) \right] \right\} \end{aligned}$$

(Equation continued)

$$\begin{aligned}
& \times \left\{ \frac{g_j^2(2)}{2l'+1} \left[(l'+m'+\frac{1}{2}) c^{(k)}(l', m'-\frac{1}{2}; l', m'-\frac{1}{2}) \right. \right. \\
& \quad \left. \left. + (l'-m'+\frac{1}{2}) c^{(k)}(l', m'+\frac{1}{2}; l', m'+\frac{1}{2}) \right] \right. \\
& \quad \left. + \frac{f_j^2(2)}{2l'+1} \left[(l'-m'+\frac{3}{2}) c^{(k)}(l'+1, m'-\frac{1}{2}; l'+1, m'-\frac{1}{2}) \right. \right. \\
& \quad \left. \left. + (l'+m'+\frac{3}{2}) c^{(k)}(l'+1, m'+\frac{1}{2}; l'+1, m'+\frac{1}{2}) \right] \right\} \\
& \times \frac{r_{<}^k}{r_{>}^{k+1}} r_1^2 dr_1 r_2^2 dr_2. \quad (25)
\end{aligned}$$

The summation over k goes from zero to the smaller of $2l$ or $2l'$. Expressing the $c^{(k)}$ of Eqs. (24b) to (24d) in terms of associated Legendre polynomials similar to Eq. (24a) and substituting into the factor multiplying g^2 in Eq. (25) gives

$$\begin{aligned}
& \frac{l+m+\frac{1}{2}}{2l+1} c^{(k)}(l, m-\frac{1}{2}; l, m-\frac{1}{2}) + \frac{l-m+\frac{1}{2}}{2l+1} c^{(k)}(l, m+\frac{1}{2}; l, m+\frac{1}{2}) \\
& = \frac{(l-m+\frac{1}{2})!}{2(l+m+\frac{1}{2})!} \left\{ (l+m+\frac{1}{2})^2 \int_{-1}^1 \left[P_l^{m-\frac{1}{2}}(z) \right]^2 P_k(z) dz \right. \\
& \quad \left. + \int_{-1}^1 \left[P_l^{m+\frac{1}{2}}(z) \right]^2 P_k(z) dz \right\}. \quad (26)
\end{aligned}$$

Similarly for the factor multiplying f^2 in Eq. (25)

$$\begin{aligned}
& \frac{l-m+\frac{3}{2}}{2l+3} c^{(k)}(l+1, m-\frac{1}{2}; l+1, m-\frac{1}{2}) \\
& + \frac{l+m+\frac{3}{2}}{2l+3} c^{(k)}(l+1, m+\frac{1}{2}; l+1, m+\frac{1}{2}) \\
& = \frac{(l-m+\frac{3}{2})!}{2(l+m+\frac{3}{2})!} \left\{ (l-m+\frac{3}{2})^2 \int_{-1}^1 \left[P_{l+1}^{m-\frac{1}{2}}(z) \right]^2 P_k(z) dz \right. \\
& \quad \left. + \int_{-1}^1 \left[P_{l+1}^{m+\frac{1}{2}}(z) \right]^2 P_k(z) dz \right\}. \quad (27)
\end{aligned}$$

From the relationships of the associated Legendre polynomials*

$$P_{l+1}^{m+\frac{1}{2}}(z) - z P_l^{m+\frac{1}{2}}(z) = (l+m+\frac{1}{2}) \sqrt{1-z^2} P_l^{m-\frac{1}{2}}(z), \quad (28)$$

and

$$z P_{l+1}^{m+\frac{1}{2}}(z) - P_l^{m+\frac{1}{2}}(z) = (l-m+\frac{3}{2}) \sqrt{1-z^2} P_{l+1}^{m-\frac{1}{2}}(z), \quad (29)$$

one obtains by squaring and subtracting of Eqs. (28) and (29)

$$\begin{aligned}
& (l+m+\frac{1}{2})^2 \left[P_l^{m-\frac{1}{2}}(z) \right]^2 + \left[P_l^{m+\frac{1}{2}}(z) \right]^2 \\
& = (l-m+\frac{3}{2})^2 \left[P_{l+1}^{m-\frac{1}{2}}(z) \right]^2 + \left[P_{l+1}^{m+\frac{1}{2}}(z) \right]^2. \quad (30)
\end{aligned}$$

Using Eq. (30) in Eqs. (26) or (27) proves that the coefficients multiplying the functions g^2 and f^2 in Eq. (25) are identical. For the case $j = l + \frac{1}{2}$, $j' = l' + \frac{1}{2}$ one may define

$$\begin{aligned}
d_F^{(k)}(l, j, m; l', j', m') & \equiv \left[\frac{l+m+\frac{1}{2}}{2l+1} c^{(k)}(l, m-\frac{1}{2}; l, m-\frac{1}{2}) \right. \\
& \quad \left. + \frac{l-m+\frac{1}{2}}{2l+1} c^{(k)}(l, m+\frac{1}{2}; l, m+\frac{1}{2}) \right] \\
& \times \left[\frac{l'+m'+\frac{1}{2}}{2l'+1} c^{(k)}(l', m'-\frac{1}{2}; l', m'-\frac{1}{2}) \right. \\
& \quad \left. + \frac{l'-m'+\frac{1}{2}}{2l'+1} c^{(k)}(l', m'+\frac{1}{2}; l', m'+\frac{1}{2}) \right]. \quad (31)
\end{aligned}$$

Similarly one obtains for the case $j = l - \frac{1}{2}$, $j' = l' - \frac{1}{2}$

$$\begin{aligned}
d_F^{(k)}(l, j, m; l', j', m') & \equiv \left[\frac{l-m+\frac{1}{2}}{2l+1} c^{(k)}(l, m-\frac{1}{2}; l, m-\frac{1}{2}) \right. \\
& \quad \left. + \frac{l+m+\frac{1}{2}}{2l+1} c^{(k)}(l, m+\frac{1}{2}; l, m+\frac{1}{2}) \right] \\
& \times \left[\frac{l'-m'+\frac{1}{2}}{2l'+1} c^{(k)}(l', m'-\frac{1}{2}; l', m'-\frac{1}{2}) \right. \\
& \quad \left. + \frac{l'+m'+\frac{1}{2}}{2l'+1} c^{(k)}(l', m'+\frac{1}{2}; l', m'+\frac{1}{2}) \right]. \quad (32)
\end{aligned}$$

Finally for the cases $j = l \pm \frac{1}{2}$, $j' = l' \mp \frac{1}{2}$, where one respectively either always uses the upper or always the lower sign, one obtains

$$\begin{aligned}
d_F^{(k)}(l, j, m; l', j', m') & \equiv \left[\frac{l+m+\frac{1}{2}}{2l+1} c^{(k)}(l, m-\frac{1}{2}; l, m-\frac{1}{2}) \right. \\
& \quad \left. + \frac{l-m+\frac{1}{2}}{2l+1} c^{(k)}(l, m+\frac{1}{2}; l, m+\frac{1}{2}) \right] \\
& \times \left[\frac{l'+m'+\frac{1}{2}}{2l'+1} c^{(k)}(l', m'-\frac{1}{2}; l', m'-\frac{1}{2}) \right. \\
& \quad \left. + \frac{l'-m'+\frac{1}{2}}{2l'+1} c^{(k)}(l', m'+\frac{1}{2}; l', m'+\frac{1}{2}) \right]. \quad (33)
\end{aligned}$$

Writing for the Slater integral

$$\begin{aligned}
F_{1j}^{(k)} & \equiv 2 \int_0^\infty \int_0^\infty \left[g_1^2(1) + f_1^2(1) \right] \frac{r_{<}^k}{r_{>}^{k+1}} \\
& \times \left[g_j^2(2) + f_j^2(2) \right] r_1^2 dr_1 r_2^2 dr_2, \quad (34)
\end{aligned}$$

* See, e.g., Ref. 1, Eqs. (A 14-11 and A 14-14).

and using the definitions of the $d_F^{(k)}$, Eqs. (31), (32), and (33), one may express Eq. (25) by

$$j_{ij}^{(0)} = \sum_k d_{F,ij}^{(k)} F_{ij}^{(k)}. \quad (35)$$

C. Calculation of the exchange integral

Substitution of Eqs. (18) and (22a) into Eq. (17) yields for the case $j = l + \frac{1}{2}$, $j' = l' + \frac{1}{2}$

$$\begin{aligned} K_{ij}^{(0)} &= 2 \iint \left\{ g_i(1) g_j(1) \right. \\ &\times \left[\sqrt{\frac{l+m+\frac{3}{2}}{2l+1}} \sqrt{\frac{l'+m'+\frac{3}{2}}{2l'+1}} Y_{l,m-\frac{1}{2}}^* Y_{l',m'-\frac{1}{2}}^{(1)} \right. \\ &\quad \left. + \sqrt{\frac{l-m+\frac{3}{2}}{2l+1}} \sqrt{\frac{l'-m'+\frac{3}{2}}{2l'+1}} Y_{l,m+\frac{1}{2}}^* Y_{l',m'+\frac{1}{2}}^{(1)} \right] \\ &+ f_i(1) f_j(1) \left[\sqrt{\frac{l-m+\frac{3}{2}}{2l+3}} \sqrt{\frac{l'-m'+\frac{3}{2}}{2l'+3}} Y_{l+1,m-\frac{1}{2}}^* Y_{l'+1,m'-\frac{1}{2}}^{(1)} \right. \\ &\quad \left. + \sqrt{\frac{l+m+\frac{3}{2}}{2l+3}} \sqrt{\frac{l'+m'+\frac{3}{2}}{2l'+3}} Y_{l+1,m+\frac{1}{2}}^* Y_{l'+1,m'+\frac{1}{2}}^{(1)} \right] \Big\} \\ &\times \left\{ g_i(2) g_j(2) \left[\sqrt{\frac{l+m+\frac{3}{2}}{2l+1}} \sqrt{\frac{l'+m'+\frac{3}{2}}{2l'+1}} Y_{l,m-\frac{1}{2}}^* Y_{l',m'-\frac{1}{2}}^{(2)} \right. \right. \\ &\quad \left. + \sqrt{\frac{l-m+\frac{3}{2}}{2l+1}} \sqrt{\frac{l'-m'+\frac{3}{2}}{2l'+1}} Y_{l,m+\frac{1}{2}}^* Y_{l',m'+\frac{1}{2}}^{(2)} \right] \\ &+ f_i(2) f_j(2) \left[\sqrt{\frac{l-m+\frac{3}{2}}{2l+3}} \sqrt{\frac{l'-m'+\frac{3}{2}}{2l'+3}} Y_{l+1,m-\frac{1}{2}}^* Y_{l'+1,m'-\frac{1}{2}}^{(2)} \right. \\ &\quad \left. + \sqrt{\frac{l+m+\frac{3}{2}}{2l+3}} \sqrt{\frac{l'+m'+\frac{3}{2}}{2l'+3}} Y_{l+1,m+\frac{1}{2}}^* Y_{l'+1,m'+\frac{1}{2}}^{(2)} \right] \Big\} \\ &\times \sum_{k=0}^{\infty} \sum_{m''=k}^k \frac{4\pi}{2k+1} \frac{r_1^k}{r_2^{k+1}} Y_{k,m''}^*(1) Y_{k,m''}(2) \end{aligned}$$

$$\times r_1^2 \sin \theta_1 dr_1 d\theta_1 d\varphi_1 r_2^2 \sin \theta_2 dr_2 d\theta_2 d\varphi_2. \quad (36)$$

The integrations over angles θ_1 and φ_1 (dropping the index) give

$$\begin{aligned} &\sqrt{\frac{4\pi}{2k+1}} \int_0^\pi \int_0^{2\pi} Y_{l,m-\frac{1}{2}}^* Y_{l',m'-\frac{1}{2}} Y_{k,m''}^* d\varphi \sin \theta d\theta \\ &= \frac{\sqrt{(2l+1)(2l'+1)}}{4\pi} \sqrt{\frac{(l-m+\frac{1}{2})!(l'-m'+\frac{1}{2})!}{(l+m-\frac{1}{2})!(l'+m'-\frac{1}{2})!}} \sqrt{\frac{(k-m'')!}{(k+m'')!}} \\ &\times \int_0^{2\pi} e^{-(m-m'')\varphi} d\varphi \\ &\times \int_0^\pi P_l^{m-\frac{1}{2}}(\cos \theta) P_{l'}^{m'-\frac{1}{2}}(\cos \theta) P_k^{m''}(\cos \theta) \sin \theta d\theta \end{aligned}$$

(Equation Continued)

$$\begin{aligned} &= \frac{\sqrt{(2l-1)(2l'+1)}}{2} \sqrt{\frac{(l-m+\frac{1}{2})!(l'-m'+\frac{1}{2})!(k-m'')!}{(l+m-\frac{1}{2})!(l'+m'-\frac{1}{2})!(k+m'')!}} \\ &\times \int_0^\pi P_l^{m-\frac{1}{2}}(\cos \theta) P_{l'}^{m'-\frac{1}{2}}(\cos \theta) P_k^{m''}(\cos \theta) \sin \theta d\theta \\ &= c^{(k)}(l, m-\frac{1}{2}; l', m'-\frac{1}{2}). \quad (37a) \end{aligned}$$

The integral over φ is zero, unless $m'' = m' - m$. The coefficients $c^{(k)}$ are tabulated^{1,5} up to values of $l = 3$ and all corresponding values of m . The remaining angular integrations are similarly

$$\begin{aligned} &\sqrt{\frac{4\pi}{2k+1}} \int_0^\pi \int_0^{2\pi} Y_{l,m+\frac{1}{2}}^* Y_{l',m'+\frac{1}{2}} Y_{k,m''}^* d\varphi \sin \theta d\theta \\ &= c^{(k)}(l, m+\frac{1}{2}; l', m'+\frac{1}{2}), \quad (37b) \end{aligned}$$

$$\begin{aligned} &\sqrt{\frac{4\pi}{2k+1}} \int_0^\pi \int_0^{2\pi} Y_{l+1,m-\frac{1}{2}}^* Y_{l'+1,m'-\frac{1}{2}} Y_{k,m''}^* d\varphi \sin \theta d\theta \\ &= c^{(k)}(l+1, m-\frac{1}{2}; l'+1, m'-\frac{1}{2}), \quad (37c) \end{aligned}$$

$$\begin{aligned} &\sqrt{\frac{4\pi}{2k+1}} \int_0^\pi \int_0^{2\pi} Y_{l+1,m+\frac{1}{2}}^* Y_{l'+1,m'+\frac{1}{2}} Y_{k,m''}^* d\varphi \sin \theta d\theta \\ &= c^{(k)}(l+1, m+\frac{1}{2}; l'+1, m'+\frac{1}{2}). \quad (37d) \end{aligned}$$

Angular integrations over angles θ_2 and φ_2 give the same results as Eqs. (37a) to (37d). The highest value of k for which $c^{(k)}$ is not zero is $l + l'$. Substitution of Eqs. (37a) to (37d) into Eq. (36) yields

$$\begin{aligned} K_{ij}^{(0)} &= 2 \sum_{k=0}^{l+l'} \iint \left\{ g_i(1) g_j(1) \right. \\ &\times \left[\sqrt{\frac{l+m+\frac{3}{2}}{2l+1}} \sqrt{\frac{l'+m'+\frac{3}{2}}{2l'+1}} c^{(k)}(l, m-\frac{1}{2}; l', m'-\frac{1}{2}) \right. \\ &\quad \left. + \sqrt{\frac{l-m+\frac{3}{2}}{2l+1}} \sqrt{\frac{l'-m'+\frac{3}{2}}{2l'+1}} c^{(k)}(l, m+\frac{1}{2}; l', m'+\frac{1}{2}) \right] \\ &+ f_i(1) f_j(1) \left[\sqrt{\frac{l-m+\frac{3}{2}}{2l+3}} \sqrt{\frac{l'-m'+\frac{3}{2}}{2l'+3}} c^{(k)}(l+1, m-\frac{1}{2}; l'+1, m'-\frac{1}{2}) \right. \\ &\quad \left. + \sqrt{\frac{l+m+\frac{3}{2}}{2l+3}} \sqrt{\frac{l'+m'+\frac{3}{2}}{2l'+3}} c^{(k)}(l+1, m+\frac{1}{2}; l'+1, m'+\frac{1}{2}) \right] \Big\} \\ &\times \left\{ g_i(2) g_j(2) \left[\sqrt{\frac{l+m+\frac{3}{2}}{2l+1}} \sqrt{\frac{l'+m'+\frac{3}{2}}{2l'+1}} c^{(k)}(l, m-\frac{1}{2}; l', m'-\frac{1}{2}) \right. \right. \\ &\quad \left. + \sqrt{\frac{l-m+\frac{3}{2}}{2l+1}} \sqrt{\frac{l'-m'+\frac{3}{2}}{2l'+1}} c^{(k)}(l, m+\frac{1}{2}; l', m'+\frac{1}{2}) \right] \end{aligned}$$

(Equation Continued)

$$\begin{aligned}
& + f_1(2) g_j(2) \left[\sqrt{\frac{l-m+\frac{3}{2}}{2l+3}} \sqrt{\frac{l'-m'+\frac{3}{2}}{2l'+3}} c^{(k)}(l+1, m-\frac{1}{2}; l'+1, m'-\frac{1}{2}) \right. \\
& \quad \left. + \sqrt{\frac{l+m+\frac{3}{2}}{2l+3}} \sqrt{\frac{l'+m'+\frac{3}{2}}{2l'+3}} c^{(k)}(l+1, m-\frac{1}{2}; l'+1, m'-\frac{1}{2}) \right] \Bigg\} \\
& \times \frac{r_{<}^k}{r_{>}^{k+1}} r_1^2 dr_1 r_2^2 dr_2. \quad (38)
\end{aligned}$$

Using Eqs. (37a) to (37d) in terms of associated Legendre polynomials one obtains for the factor multiplying $g_1 g_j$ in Eq. (38)

$$\begin{aligned}
& \left[\sqrt{\frac{l+m+\frac{1}{2}}{2l+1}} \sqrt{\frac{l'+m'+\frac{1}{2}}{2l'+1}} c^{(k)}(l, m-\frac{1}{2}; l', m'-\frac{1}{2}) \right. \\
& \quad \left. + \sqrt{\frac{l-m+\frac{1}{2}}{2l+1}} \sqrt{\frac{l'-m'+\frac{1}{2}}{2l'+1}} c^{(k)}(l, m+\frac{1}{2}; l', m'+\frac{1}{2}) \right] \\
& = \frac{1}{2} \sqrt{\frac{(l-m+\frac{1}{2})!(l'-m'+\frac{1}{2})!(k-m'+m)!}{(l+m+\frac{1}{2})!(l'+m'+\frac{1}{2})!(k+m'-m)!}} \\
& \times \left\{ (l+m+\frac{1}{2})(l'+m'+\frac{1}{2}) \int_{-1}^1 P_l^{m-\frac{1}{2}}(z) P_{l'}^{m'-\frac{1}{2}}(z) P_k^{m'-m}(z) dz \right. \\
& \quad \left. + \int_{-1}^1 P_l^{m+\frac{1}{2}}(z) P_{l'}^{m'+\frac{1}{2}}(z) P_k^{m'-m}(z) dz \right\}. \quad (39)
\end{aligned}$$

Similarly for the factor multiplying $f_1 f_j$ in Eq. (38)

$$\begin{aligned}
& \left[\sqrt{\frac{l-m+\frac{3}{2}}{2l+3}} \sqrt{\frac{l'-m'+\frac{3}{2}}{2l'+3}} c^{(k)}(l+1, m-\frac{1}{2}; l'+1, m'-\frac{1}{2}) \right. \\
& \quad \left. + \sqrt{\frac{l+m+\frac{3}{2}}{2l+3}} \sqrt{\frac{l'+m'+\frac{3}{2}}{2l'+3}} c^{(k)}(l+1, m+\frac{1}{2}; l'+1, m'+\frac{1}{2}) \right] \\
& = \frac{1}{2} \sqrt{\frac{(l-m+\frac{1}{2})!(l'-m'+\frac{1}{2})!(k-m'+m)!}{(l+m+\frac{1}{2})!(l'+m'+\frac{1}{2})!(k+m'-m)!}} \\
& \times \left\{ (l-m+\frac{3}{2})(l'-m'+\frac{3}{2}) \int_{-1}^1 P_{l+1}^{m-\frac{1}{2}}(z) P_{l'+1}^{m'-\frac{1}{2}}(z) P_k^{m'-m}(z) dz \right. \\
& \quad \left. + \int_{-1}^1 P_{l+1}^{m+\frac{1}{2}}(z) P_{l'+1}^{m'+\frac{1}{2}}(z) P_k^{m'-m}(z) dz \right\}. \quad (40)
\end{aligned}$$

Writing Eq. (28) once with l and m , and once with l' and m' , then forming the product of these two equations, and forming a similar product with l, m and l', m' in Eq. (29), one obtains by subtraction of the two product equations

$$\begin{aligned}
& (l-m+\frac{3}{2})(l'-m'+\frac{3}{2}) P_{l+1}^{m-\frac{1}{2}}(z) P_{l'+1}^{m'-\frac{1}{2}}(z) + P_{l+1}^{m+\frac{1}{2}}(z) P_{l'+1}^{m'+\frac{1}{2}}(z) \\
& = (l+m+\frac{1}{2})(l'+m'+\frac{1}{2}) P_l^{m-\frac{1}{2}}(z) P_{l'}^{m'-\frac{1}{2}}(z) \\
& \quad + P_l^{m+\frac{1}{2}}(z) P_{l'}^{m'+\frac{1}{2}}(z). \quad (41)
\end{aligned}$$

This proves that the coefficients multiplying $g_1 g_j$ and $f_1 f_j$ in Eq. (38) are identical. For the case $j = l + \frac{1}{2}$, $j' = l' + \frac{1}{2}$ one may define

$$\begin{aligned}
& d_G^{(k)}(l, j, m; l', j', m') \\
& = \left[\sqrt{\frac{(l+m+\frac{1}{2})(l'+m'+\frac{1}{2})}{(2l+1)(2l'+1)}} c^{(k)}(l, m-\frac{1}{2}; l', m'-\frac{1}{2}) \right. \\
& \quad \left. + \sqrt{\frac{(l-m+\frac{1}{2})(l'-m'+\frac{1}{2})}{(2l+1)(2l'+1)}} c^{(k)}(l, m+\frac{1}{2}; l', m'+\frac{1}{2}) \right]^2, \quad (42)
\end{aligned}$$

similarly for the case $j = l - \frac{1}{2}$, $j' = l' - \frac{1}{2}$ one can define

$$\begin{aligned}
& d_G^{(k)}(l, j, m; l', j', m') \\
& = \left[\sqrt{\frac{(l+m+\frac{1}{2})(l'+m'+\frac{1}{2})}{(2l+1)(2l'+1)}} c^{(k)}(l, m-\frac{1}{2}; l', m'-\frac{1}{2}) \right. \\
& \quad \left. + \sqrt{\frac{(l-m+\frac{1}{2})(l'-m'+\frac{1}{2})}{(2l+1)(2l'+1)}} c^{(k)}(l, m+\frac{1}{2}; l', m'+\frac{1}{2}) \right]^2, \quad (43)
\end{aligned}$$

and for the cases $j = l \pm \frac{1}{2}$, $j' = l' \pm \frac{1}{2}$ (where either always the upper sign or always the lower sign applies)

$$\begin{aligned}
& d_G^{(k)}(l, j, m; l', j', m') \\
& = \left[\sqrt{\frac{(l+m+\frac{1}{2})(l'+m'+\frac{1}{2})}{(2l+1)(2l'+1)}} c^{(k)}(l, m-\frac{1}{2}; l', m'-\frac{1}{2}) \right. \\
& \quad \left. - \sqrt{\frac{(l-m+\frac{1}{2})(l'-m'+\frac{1}{2})}{(2l+1)(2l'+1)}} c^{(k)}(l, m+\frac{1}{2}; l', m'+\frac{1}{2}) \right]^2. \quad (44)
\end{aligned}$$

From the Slater integral

$$\begin{aligned}
G_{ij}^{(k)} &= 2 \int_0^\infty \int_0^\infty \left[g_i(1) g_j(1) + f_i(1) f_j(1) \right] \\
& \quad + \frac{r_{<}^k}{r_{>}^{k+1}} \left[g_i(2) g_j(2) + f_i(2) f_j(2) \right] r_1^2 dr_1 r_2^2 dr_2, \quad (45)
\end{aligned}$$

and Eqs. (42), (43) and (44), one may express Eq. (38) as

$$K_{ij}^{(0)} = \sum_k d_{G,ij}^{(k)} G_{ij}^{(k)}. \quad (46)$$

It should be noted that for $i = j$

$$G_{ii}^{(k)} = F_{ii}^{(k)}, \quad (47)$$

and

$$d_{G,11}^{(k)} = d_{F,11}^{(k)} \quad (48)$$

III. AVERAGE ENERGY OF AN ELECTRON CONFIGURATION

Many of the $d_F^{(k)}$ and $d_G^{(k)}$ have been calculated,⁶ and following previously established notation,

$$T(nljm, n'l'j'm') = \sum_k \left[d_F^{(k)} F^{(k)} - d_G^{(k)} G^{(k)} \right]_{nljm, n'l'j'm'}, \quad (49)$$

these coefficients have been tabulated up to values of $l = l' = 2$ (d-d electrons) with all the corresponding values of j, j', m , and m' .⁷ Table I lists the coefficients for $l = 0$ to $l = 3$ and $l' = 3$ with all corresponding values of j, j', m , and m' .

Of particular interest to the energy level calculations presented here are the weighted mean, or centroids, of the various multiplet energies which can be obtained from Eq. (49). The weighting factor is $2J + 1$, where J takes on all integers between $|m - m'|$ and $m + m'$ for nonequivalent electrons. For equivalent electrons ($n = n', l = l'$), the values of J for which $m = m'$ must be excluded. For example, for nonequivalent p electrons one obtains for the average $\bar{T}(nljm, n'l'j'm') = \tau_{1j}$

$$\begin{aligned} np_{\frac{1}{2}}, n'p_{\frac{1}{2}}: J = 1: T &= F^{(0)} - G^{(0)} \\ J = 0: T &= F^{(0)} + G^{(0)} \\ \tau &= F^{(0)} + \frac{-3+1}{3+1} G^{(0)} = F^{(0)} - \frac{1}{2} G^{(0)}, \end{aligned}$$

$$\begin{aligned} np_{\frac{3}{2}}, n'p_{\frac{3}{2}}: J = 2: T &= F^{(0)} - \frac{1}{25} G^{(2)} \\ (\text{or } np_{\frac{3}{2}}, n'p_{\frac{1}{2}}): J = 1: T &= F^{(0)} - \frac{1}{5} G^{(2)} \\ \tau &= F^{(0)} - \frac{1}{10} G^{(2)}, \end{aligned}$$

$$\begin{aligned} np_{\frac{3}{2}}, n'p_{\frac{3}{2}}: J = 3: T &= F^{(0)} + \frac{1}{25} F^{(2)} - G^{(0)} \\ &\quad - \frac{1}{25} G^{(2)} \\ J = 2: T &= F^{(0)} - \frac{3}{25} F^{(2)} + G^{(0)} - \frac{3}{25} G^{(2)} \\ J = 1: T &= F^{(0)} + \frac{1}{25} F^{(2)} - G^{(0)} - \frac{1}{25} G^{(2)} \\ J = 0: T &= F^{(0)} + \frac{5}{25} F^{(2)} + G^{(0)} + \frac{5}{25} G^{(2)} \\ \tau &= F^{(0)} = \frac{1}{4} G^{(0)} - \frac{1}{20} G^{(2)}, \end{aligned}$$

and for equivalent p electrons one obtains

$$\begin{aligned} np_{\frac{1}{2}}: J = 0: T &= F^{(0)} \\ \tau &= F^{(0)} \\ np_{\frac{3}{2}}: J = 2: T &= F^{(0)} - \frac{3}{25} F^{(2)} \\ J = 0: T &= F^{(0)} + \frac{5}{25} F^{(2)} \\ \tau &= F^{(0)} - \frac{1}{15} F^{(2)}, \end{aligned}$$

$np_{\frac{1}{2}}, np_{\frac{3}{2}}$ gives the same as $np_{\frac{1}{2}}, n'p_{\frac{3}{2}}$ above. For nonequivalent electrons the coefficients for $F^{(k)}$ ($k > 0$) are zero for the averages, so that besides $F^{(0)}$ only the $G^{(k)}$ contribute. For equivalent electrons $F^{(k)} = G^{(k)}$; and the averages can be expressed using the $F^{(k)}$ only. In Tables II and III are the τ_{1j} , i.e., average coefficients $d^{(k)}$, listed for nonequivalent and equivalent electrons, respectively.

The $F^{(k)}$ and the $G^{(k)}$ Slater integrals have been calculated from hydrogenic wave functions using Eqs. (34) and (45), respectively. For $F^{(0)}$ relativistic wave functions* are used for all states with quantum numbers n, l, j for which bound electrons may be expected in the periodic table and for some additional ones, i.e., through the complete $n = 5$ shell, for $6s_{1/2}, 6p_{1/2}, 6p_{3/2}, 6d_{3/2}, 6d_{5/2}$, and $7s_{1/2}$. The remaining levels in the $n = 6$ and $n = 7$ shell are lumped together by some appropriate choice of quantum numbers for some "average" level, in particular $6g_{7/2}$ and $7h_{9/2}$ have been chosen as representative average levels. An average level has also been chosen for all shells from $n = 8$ through $n = 23$. The n, l, j values for these are 8, 4, 7/2; 9, 5, 9/2; 10, 5, 9/2; 11, 6, 11/2; 12, 6, 11/2; 13, 7, 13/2; 14, 7, 13/2; 15, 8, 15/2; 16, 8, 15/2; 17, 9, 17/2; 18, 9, 17/2; 19, 10, 19/2; 20, 10, 19/2; 21, 11, 21/2; 22, 11, 21/2; and 23, 12, 23/2. Since $F_{ij}^{(k)} = F_{ji}^{(k)}$ (and similarly for the $G^{(k)}$) it is sufficient to calculate only the cases $j \leq i$. Starting with Table IV the n, l, j are not explicitly listed, but they have a one-to-one correspondence to the i, j ; e.g., $i = 26$ corresponds to $6s_{1/2}$, $i = 30$ to $6d_{5/2}$, $i = 31$ to $6g_{7/2}$, $i = 32$ to $7s_{1/2}$, $i = 33$ to $7h_{9/2}$, $i = 34$ to $8g_{7/2}$, etc. The relativistic hydrogenic $F_{ij}^{(0)}$ are presented in Tables IV through VIII for $Z = 1, 30, 56, 74$, and 92.

* Defined in Section 14 of Ref. 4.

TABLE I

Tables of $T(nljm, n'l'j'm')$ for f-electrons

The numbers given are to be used as coefficients for the integrals at the top of the column. To each of these T's is to be added $F^{(0)}(nl, n'l')$, which is omitted from the table for convenience.

l	l'	j	m	j'	m'	$\frac{F^2}{525}$	$\frac{G^{(2)}}{1225}$	$\frac{G^{(4)}}{3969}$
s	f	1/2	$\pm 1/2$	7/2	$\pm 7/2$	7		
			$\pm 1/2$		$\pm 5/2$	6		
			$\pm 1/2$		$\pm 3/2$	5		
			$\pm 1/2$		$\pm 1/2$	4		
			$\pm 1/2$		$\mp 1/2$	3		
			$\pm 1/2$		$\mp 3/2$	2		
			$\pm 1/2$		$\mp 5/2$	1		
			$\pm 1/2$		$\mp 7/2$	0		
		1/2	$\pm 1/2$	5/2	$\pm 5/2$	1		
			$\pm 1/2$		$\pm 3/2$	2		
			$\pm 1/2$		$\pm 1/2$	3		
			$\pm 1/2$		$\mp 1/2$	4		
			$\pm 1/2$		$\mp 3/2$	5		
			$\pm 1/2$		$\mp 5/2$	6		
p	f	3/2	$\pm 3/2$	7/2	$\pm 7/2$	35	315	21
			$\pm 3/2$		$\pm 5/2$	5	180	54
			$\pm 3/2$		$\pm 3/2$	-15	90	90
			$\pm 3/2$		$\pm 1/2$	-25	36	120
			$\pm 3/2$		$\mp 1/2$	-25	9	135
			$\pm 3/2$		$\mp 3/2$	-15	0	126
			$\pm 3/2$		$\mp 5/2$	5	0	84
			$\pm 3/2$		$\mp 7/2$	35	0	0
			$\pm 1/2$		$\pm 7/2$	-35	0	98
			$\pm 1/2$		$\pm 5/2$	-5	135	121
			$\pm 1/2$		$\pm 3/2$	15	180	96
			$\pm 1/2$		$\pm 1/2$	25	162	50
			$\pm 1/2$		$\mp 1/2$	25	108	10
			$\pm 1/2$		$\mp 3/2$	15	45	3
			$\pm 1/2$		$\mp 5/2$	-5	0	56
			$\pm 1/2$		$\mp 7/2$	-35	0	196
		3/2	$\pm 3/2$	5/2	$\pm 5/2$	30	30	9
			$\pm 3/2$		$\pm 3/2$	-6	36	36
			$\pm 3/2$		$\pm 1/2$	-24	27	90
			$\pm 3/2$		$\mp 1/2$	-24	12	180
			$\pm 3/2$		$\mp 3/2$	-6	0	415
			$\pm 3/2$		$\mp 5/2$	30	0	504
			$\pm 1/2$		$\pm 5/2$	-30	40	54
			$\pm 1/2$		$\pm 3/2$	6	2	135
			$\pm 1/2$		$\pm 1/2$	24	6	216
			$\pm 1/2$		$\mp 1/2$	24	25	270
			$\pm 1/2$		$\mp 3/2$	6	32	270
			$\pm 1/2$		$\mp 5/2$	-30	0	189
		1/2	$\pm 1/2$	7/2	$\pm 7/2$	0	0	49
			$\pm 1/2$		$\pm 5/2$	0	0	98
			$\pm 1/2$		$\pm 3/2$	0	0	147
			$\pm 1/2$		$\pm 1/2$	0	0	196
			$\pm 1/2$		$\mp 1/2$	0	0	245
			$\pm 1/2$		$\mp 3/2$	0	0	294
			$\pm 1/2$		$\mp 5/2$	0	0	343
			$\pm 1/2$		$\mp 7/2$	0	0	392
		1/2	$\pm 1/2$	5/2	$\pm 5/2$	0	245	0
			$\pm 1/2$		$\pm 3/2$	0	196	0
			$\pm 1/2$		$\pm 1/2$	0	147	0
			$\pm 1/2$		$\mp 1/2$	0	98	0
			$\pm 1/2$		$\mp 3/2$	0	49	0
			$\pm 1/2$		$\mp 5/2$	0	0	0

TABLE I (Continued)

ℓ	ℓ'	j	m	j'	m'	$F^{(2)}$ <u>3675</u>	$F^{(4)}$ <u>4851</u>	$G^{(1)}$ <u>- 1225</u>	$G^{(3)}$ <u>- 11025</u>	$G^{(5)}$ <u>- 53361</u>
d	f	5/2	+ 5/2	7/2	+ 7/2	350	21	525	350	35
			$\pm$ 5/2		$\pm$ 5/2	50	- 39	150	600	150
			$\pm$ 5/2		$\pm$ 3/2	-150	- 9	25	600	375
			$\pm$ 5/2		$\pm$ 1/2	-250	27	0	400	700
			$\pm$ 5/2		$\mp$ 1/2	-250	27	0	150	1050
			$\pm$ 5/2		$\mp$ 3/2	-150	- 9	0	0	1260
			$\pm$ 5/2		$\mp$ 5/2	50	- 39	0	0	1050
			$\pm$ 5/2		$\mp$ 7/2	350	21	0	0	0
			$\pm$ 3/2		$\pm$ 7/2	- 70	- 63	0	700	196
			$\pm$ 3/2		$\pm$ 5/2	- 10	117	375	250	529
			$\pm$ 3/2		$\pm$ 3/2	30	27	250	0	810
			$\pm$ 3/2		$\pm$ 1/2	50	- 81	75	200	845
			$\pm$ 3/2		$\mp$ 1/2	50	- 81	0	500	560
			$\pm$ 3/2		$\mp$ 3/2	30	27	0	450	126
			$\pm$ 3/2		$\mp$ 5/2	- 10	117	0	0	84
			$\pm$ 3/2		$\mp$ 7/2	- 70	- 63	0	0	1470
			$\pm$ 1/2		$\pm$ 7/2	-280	42	0	525	588
			$\pm$ 1/2		$\pm$ 5/2	- 40	- 78	0	50	896
			$\pm$ 1/2		$\pm$ 3/2	120	- 18	250	375	726
			$\pm$ 1/2		$\pm$ 1/2	200	54	300	300	300
			$\pm$ 1/2		$\mp$ 1/2	200	54	150	25	10
			$\pm$ 1/2		$\mp$ 3/2	120	- 18	0	150	168
			$\pm$ 1/2		$\mp$ 5/2	- 40	- 78	0	675	756
			$\pm$ 1/2		$\mp$ 7/2	-280	42	0	0	1176
		5/2	$\pm$ 5/2	5/2	$\pm$ 5/2	300	11	25	100	25
			$\pm$ 5/2		$\pm$ 3/2	- 60	- 33	10	240	150
			$\pm$ 5/2		$\pm$ 1/2	-240	22	0	300	525
			$\pm$ 5/2		$\mp$ 1/2	-240	22	0	200	1400
			$\pm$ 5/2		$\mp$ 3/2	- 60	- 33	0	0	3150
			$\pm$ 5/2		$\mp$ 5/2	300	11	0	0	6300
			$\pm$ 3/2		$\pm$ 5/2	- 60	- 33	10	240	150
			$\pm$ 3/2		$\pm$ 3/2	12	99	9	196	625
			$\pm$ 3/2		$\pm$ 1/2	48	- 66	16	24	1500
			$\pm$ 3/2		$\mp$ 1/2	48	- 66	0	60	2635
			$\pm$ 3/2		$\mp$ 3/2	12	99	0	320	3500
			$\pm$ 3/2		$\mp$ 5/2	- 60	- 33	0	0	3150
			$\pm$ 1/2		$\pm$ 5/2	-240	22	0	500	525
			$\pm$ 1/2		$\pm$ 3/2	48	- 66	16	24	1500
			$\pm$ 1/2		$\pm$ 1/2	192	44	1	64	2500
			$\pm$ 1/2		$\mp$ 1/2	192	44	18	192	3000
			$\pm$ 1/2		$\mp$ 3/2	48	- 66	0	60	2625
			$\pm$ 1/2		$\mp$ 5/2	-240	22	0	200	1400
		3/2	$\pm$ 3/2	7/2	$\pm$ 7/2	245	0	0	175	49
			$\pm$ 3/2		$\pm$ 5/2	35	0	0	250	196
			$\pm$ 3/2		$\pm$ 3/2	-105	0	0	250	490
			$\pm$ 3/2		$\pm$ 1/2	-175	0	0	200	980
			$\pm$ 3/2		$\mp$ 1/2	-175	0	0	125	1715
			$\pm$ 3/2		$\mp$ 3/2	-105	0	0	50	2744
			$\pm$ 3/2		$\mp$ 5/2	35	0	0	0	4116
			$\pm$ 3/2		$\mp$ 7/2	245	0	0	0	5880
			$\pm$ 1/2		$\pm$ 7/2	-245	0	0	350	392
			$\pm$ 1/2		$\pm$ 5/2	- 35	0	0	75	1029
			$\pm$ 1/2		$\pm$ 3/2	105	0	0	0	1764
			$\pm$ 1/2		$\pm$ 1/2	175	0	0	50	1370
			$\pm$ 1/2		$\mp$ 1/2	175	0	0	150	1716
			$\pm$ 1/2		$\mp$ 3/2	105	0	0	225	3087
			$\pm$ 1/2		$\mp$ 5/2	- 35	0	0	200	2744
			$\pm$ 1/2		$\mp$ 7/2	-245	0	0	0	1764
		3/2	$\pm$ 3/2	5/2	$\pm$ 5/2	210	0	490	135	0
			$\pm$ 3/2		$\pm$ 3/2	- 42	0	196	324	0
			$\pm$ 3/2		$\pm$ 1/2	-168	0	49	486	0
			$\pm$ 3/2		$\mp$ 1/2	-168	0	0	540	0
			$\pm$ 3/2		$\mp$ 3/2	- 42	0	0	405	0
			$\pm$ 3/2		$\mp$ 5/2	210	0	0	0	0
			$\pm$ 1/2		$\pm$ 5/2	-210	0	0	450	0
			$\pm$ 1/2		$\pm$ 3/2	42	0	294	441	0
			$\pm$ 1/2		$\pm$ 1/2	168	0	294	216	0
			$\pm$ 1/2		$\mp$ 1/2	168	0	147	18	0
			$\pm$ 1/2		$\mp$ 3/2	42	0	0	90	0
			$\pm$ 1/2		$\mp$ 5/2	-210	0	0	675	0

TABLE I (Continued)

ℓ	ℓ'	j	m	j'	m'	$F^{(2)}$ 11025	$F^{(4)}$ 53361	$F^{(6)}$ 9018009	$-G^{(0)}$	$-G^{(2)}$ 11025	$-G^{(4)}$ 53361	$-G^{(6)}$ 9018009
f	f	7/2	$\pm 7/2$	7/2	$\pm 7/2$	1225	441	1225	1	1225	441	1225
			$\pm 7/2$		$\pm 5/2$	175	-819	-6125	0	1050	1260	7350
			$\pm 7/2$		$\pm 3/2$	-525	-189	11025	0	350	1890	24500
			$\pm 7/2$		$\pm 1/2$	-875	567	-6125	0	0	1764	58800
			$\pm 7/2$		$\mp 1/2$	-875	567	-6125	0	0	882	110250
			$\pm 7/2$		$\mp 3/2$	-525	-189	11025	0	0	0	161700
			$\pm 7/2$		$\mp 5/2$	175	-819	-6125	0	0	0	161700
			$\pm 7/2$		$\mp 7/2$	1225	441	1225	0	0	0	0
			$\pm 5/2$		$\pm 5/2$	25	1521	30625	1	25	1521	30625
			$\pm 5/2$		$\pm 3/2$	-75	351	-55125	0	800	540	68600
			$\pm 5/2$		$\pm 1/2$	-125	-1053	30625	0	750	18	102900
			$\pm 5/2$		$\mp 1/2$	-125	-1053	30625	0	0	1008	102900
			$\pm 5/2$		$\mp 3/2$	-75	351	-55125	0	0	1890	51450
			$\pm 5/2$		$\mp 5/2$	25	1521	30625	0	0	0	0
			$\pm 3/2$		$\pm 3/2$	225	81	99225	1	225	81	99225
			$\pm 3/2$		$\pm 1/2$	375	-243	-55125	0	250	972	85750
			$\pm 3/2$		$\mp 1/2$	375	-243	-55125	0	1000	864	34300
			$\pm 3/2$		$\mp 3/2$	225	81	99225	0	0	0	0
			$\pm 1/2$		$\pm 1/2$	625	729	30625	1	625	729	30625
			$\pm 1/2$		$\mp 1/2$	625	729	30625	0	0	0	0
		5/2	$\pm 5/2$	7/2	$\pm 7/2$	1050	231	0	0	175	210	1225
			$\pm 5/2$		$\pm 5/2$	150	-429	0	0	150	600	7350
			$\pm 5/2$		$\pm 3/2$	-450	-99	0	0	75	1000	25725
			$\pm 5/2$		$\pm 1/2$	-750	297	0	0	20	1200	68600
			$\pm 5/2$		$\mp 1/2$	-750	297	0	0	0	1050	154350
			$\pm 5/2$		$\mp 3/2$	-450	-99	0	0	0	560	308700
			$\pm 5/2$		$\mp 5/2$	150	-429	0	0	0	0	565950
			$\pm 5/2$		$\mp 7/2$	1050	231	0	0	0	0	970200
			$\pm 3/2$		$\pm 7/2$	-210	-693	0	0	140	756	9800
			$\pm 3/2$		$\pm 5/2$	-30	1287	0	0	5	1014	42875
			$\pm 3/2$		$\pm 3/2$	90	297	0	0	90	640	110250
			$\pm 3/2$		$\pm 1/2$	150	-891	0	0	121	120	214375
			$\pm 3/2$		$\mp 1/2$	150	-891	0	0	64	60	343000
			$\pm 3/2$		$\mp 3/2$	90	297	0	0	0	686	463050
			$\pm 3/2$		$\mp 5/2$	-30	1287	0	0	0	1344	514500
			$\pm 3/2$		$\mp 7/2$	-210	-693	0	0	0	0	404250
			$\pm 1/2$		$\pm 7/2$	-840	462	0	0	0	1323	44100
			$\pm 1/2$		$\pm 5/2$	-120	-858	0	0	160	486	137200
			$\pm 1/2$		$\pm 3/2$	360	-198	0	0	30	1	257250
			$\pm 1/2$		$\pm 1/2$	600	594	0	0	12	300	367500
			$\pm 1/2$		$\mp 1/2$	600	594	0	0	98	735	428750
			$\pm 1/2$		$\mp 3/2$	360	-198	0	0	120	578	411600
			$\pm 1/2$		$\mp 5/2$	-120	-858	0	0	0	21	308700
			$\pm 1/2$		$\mp 7/2$	-840	462	0	0	0	1176	147000
		5/2	$\pm 5/2$	5/2	$\pm 5/2$	900	121	0	1	900	121	0
			$\pm 5/2$		$\pm 3/2$	-180	-363	0	0	1080	484	0
			$\pm 5/2$		$\pm 1/2$	-720	242	0	0	540	1089	0
			$\pm 5/2$		$\mp 1/2$	-720	242	0	0	0	1694	0
			$\pm 5/2$		$\mp 3/2$	-180	-363	0	0	0	1694	0
			$\pm 5/2$		$\mp 5/2$	900	121	0	0	0	0	0
			$\pm 3/2$		$\pm 3/2$	36	1089	0	1	36	1089	0
			$\pm 3/2$		$\pm 1/2$	144	-726	0	0	432	1210	0
			$\pm 3/2$		$\mp 1/2$	144	-726	0	0	972	605	0
			$\pm 3/2$		$\mp 3/2$	36	1089	0	0	0	0	0
			$\pm 1/2$		$\pm 1/2$	576	484	0	1	576	484	0
			$\pm 1/2$		$\mp 1/2$	576	484	0	0	0	0	0

TABLE II

Table of τ_{lj} for nonequivalent electrons ($n \neq n'$, or $n = n'$ but $l \neq l'$).

The numbers given are to be used as coefficients for the integrals at the top of the column. To

$\sum_k \overline{d(k)} g(k)$
is to be added $F^{(0)}$ which has been omitted from the table for convenience.

l	j	l'	j'	$-g^{(0)}$	$-g^{(1)}$	$-g^{(2)}$	$-g^{(3)}$	$-g^{(4)}$	$-g^{(5)}$	$-g^{(6)}$	$-g^{(7)}$	$-g^{(8)}$
0	1/2	0	1/2	1/2								
0	1/2	1	1/2		1/6							
0	1/2	1	3/2		1/6							
0	1/2	2	3/2			1/10						
0	1/2	2	5/2			1/10						
0	1/2	3	5/2				1/14					
0	1/2	3	7/2				1/14					
0	1/2	4	7/2					1/18				
0	1/2	4	9/2					1/18				
1	1/2	1	1/2	1/2								
1	1/2	1	3/2			1/10						
1	1/2	2	3/2		1/6							
1	1/2	2	5/2				1/14					
1	1/2	3	5/2			1/10						
1	1/2	3	7/2					1/18				
1	1/2	4	7/2				1/14					
1	1/2	4	9/2						1/22			
1	3/2	1	3/2	1/4		1/20						
1	3/2	2	3/2		1/60		9/140					
1	3/2	2	5/2		1/10		1/35					
1	3/2	3	5/2			1/70		1/21				
1	3/2	3	7/2			9/140		5/252				
1	3/2	4	7/2				1/84		5/132			
1	3/2	4	9/2				1/21		1/66			
2	3/2	2	3/2	1/4		1/20						
2	3/2	2	5/2			1/70		1/21				
2	3/2	3	5/2		1/10		1/35					
2	3/2	3	7/2				1/84		5/132			
2	3/2	4	7/2			9/140		5/252				
2	3/2	4	9/2					1/99		9/286		
2	5/2	2	5/2	1/6		4/105		1/63				
2	5/2	3	5/2		1/210		4/315		25/693			
2	5/2	3	7/2		1/14		1/42		5/462			
2	5/2	4	7/2			1/210		5/462		25/858		
2	5/2	4	9/2			1/21		4/231		7/858		
3	5/2	3	5/2	1/6		4/105		1/63				
3	5/2	3	7/2			1/210		5/462		25/858		
3	5/2	4	7/2		1/14		1/42		5/462			
3	5/2	4	9/2				1/231		4/429		7/286	
3	7/2	3	7/2	1/8		5/168		9/616		25/3432		
3	7/2	4	7/2		1/504		3/616		75/8008		245/10296	
3	7/2	4	9/2		1/18		3/154		3/286		7/1287	
4	7/2	4	7/2	1/8		5/168		9/616		25/3432		
4	7/2	4	9/2			1/462		9/2002		7/858		49/2431
4	9/2	4	9/2	1/10		4/165		9/715		16/2145		49/12155

TABLE III

Table of τ_{ij} for equivalent electrons
($n = n'$, $l = l'$).

The numbers given are to be used as coefficients
for the integrals at the top of the column.

i	j	j'	$F^{(0)}$	$-F^{(2)}$	$-F^{(4)}$	$-F^{(6)}$	$-F^{(8)}$
0	1/2	1/2	1				
1	1/2	1/2	1				
1	1/2	3/2	1	1/10			
1	3/2	3/2	1	1/15			
2	3/2	3/2	1	1/15			
2	3/2	5/2	1	1/70	1/21		
2	5/2	5/2	1	8/175	2/105		
3	5/2	5/2	1	8/175	2/105		
3	5/2	7/2	1	1/210	5/462	25/858	
3	7/2	7/2	1	5/147	9/539	25/3003	
4	7/2	7/2	1	5/147	9/539	25/3003	
4	7/2	9/2	1	1/462	9/2002	7/858	49/2431
4	9/2	9/2	1	8/297	2/143	32/3861	98/21879

The functions $G_{ij}^{(k)}$ have been calculated from Eq. (45) using the nonrelativistic limit from hydrogenic wave functions for $Z = 1$, for all levels up to and including $6d_{5/2}$. Since the $F^{(k)}$ functions (for $k > 0$) are used only for equivalent electrons, they can be obtained from Eq. (47). Table IX presents $\sum_k d_{ij}^{(k)} G_{ij}^{(k)}$.

The average interaction energy

$$\tau_{ij}(Z) = F_{ij}^{(0)}(Z) - Z \sum_k d_{ij}^{(k)} G_{ij}^{(k)}, \quad (50)$$

is tabulated for the above mentioned values of Z in Tables X through XIV.

IV. COMPARISON WITH OTHER CALCULATIONS

To calculate the two electron interaction energies relativistically one should use the Breit equation* for a two-electron system

$$\begin{aligned} & \left[E + 2Z \left(\frac{1}{r_1} + \frac{1}{r_2} \right) - \frac{2}{\alpha^2} (\beta_1 + \beta_2) \right. \\ & \quad \left. - \frac{2}{\alpha} (\vec{\alpha}_1 \cdot \vec{p}_1 + \vec{\alpha}_2 \cdot \vec{p}_2) - \frac{2}{r_{12}} \right] \Psi \\ & = - \frac{1}{r_{12}} \left[\vec{\alpha}_1 \cdot \vec{\alpha}_2 + \frac{1}{r_{12}} (\vec{\alpha}_1 \cdot \vec{r}_{12}) (\vec{\alpha}_2 \cdot \vec{r}_{12}) \right] \Psi. \end{aligned} \quad (51)$$

Here Ψ is a function of the coordinates of the two electrons and has 16 spin components (4 for each electron). In the previous chapters equations have been developed which are equivalent to Eq. (51) with its right-hand side set equal to zero.

* See Ref. 4, p. 170 for discussion of the Breit equation and for references.

However, the complete Eq. (51) has been solved for the cases where the two electrons are in the $1s1s$, $1s2s$, or $1s3s$ configuration,⁷ and results are given with and without the contact interaction. The results without the contact interaction can be compared with the results obtained here. This comparison is presented in Table XV.

The discrepancies at large Z appear to be due to the terms of higher order in Z neglected by Layzer and Bahcall in their expansions of the wave functions.

V. INTERPOLATION OF τ_{ij}

The electron-electron interaction energy is directly proportional to Z , with correction terms⁷ proportional to Z^3 . Tables X through XIV may be interpolated to obtain a τ_{ij} table at any Z using the interpolation formulas

$$\tau_{ij}(Z) = \left\{ \left[\frac{\tau_{ij}(30)}{30} - \tau_{ij}(1) \right] \left(\frac{Z-1}{29} \right)^2 + \tau_{ij}(1) \right\} Z, \quad (1 \leq Z \leq 30), \quad (52)$$

$$\tau_{ij}(Z) = \left\{ \left[\frac{\tau_{ij}(Z_2)}{Z_2} - \frac{\tau_{ij}(Z_1)}{Z_1} \right] \frac{Z - Z_1}{Z_2 - Z_1} + \frac{\tau_{ij}(Z_1)}{Z_1} \right\} Z, \quad (30 \leq Z_1 \leq Z \leq Z_2). \quad (53)$$

Equation (52) makes use of the cubic dependence on Z ; Eq. (53) may also be used for extrapolation beyond $Z = 92$.

VI. SOME APPLICATIONS

Before the τ -tables can be used effectively, some scaling will have to be applied for the effective value of Z which the interacting electrons experience. One could use a Z_{ij}^* as a scaling parameter, determined from some mean value of the effective Z_i^* and Z_j^* which determine the potentials in which electrons i and j move, respectively. This could become a cumbersome procedure, and, as mentioned in the Introduction, is exactly what was to be avoided here. However, one can take the effective value of Z approximately into account in the scaling if one knows the self-interaction energies τ_{ii} for a neutral atom. All the relevant non-relativistic $F^{(k)}$ and $G^{(k)}$ Slater integrals have been calculated from Hartree-Fock wave functions

TABLE IV

Relativistic, hydrogenic $F_{1j}^{(0)}$ for $Z = 1$

I= 1, J=1, 1	1.250E+00											
I= 2, J=1, 2	4.198E-01	3.008E-01										
I= 3, J=1, 3	4.856E-01	3.242E-01	3.633E-01									
I= 4, J=1, 4	4.856E-01	3.242E-01	3.633E-01	3.633E-01								
I= 5, J=1, 5	1.990E-01	1.682E-01	1.735E-01	1.735E-01	1.328E-01							
I= 6, J=1, 6	2.177E-01	1.800E-01	1.879E-01	1.879E-01	1.376E-01	1.437E-01						
I= 7, J=1, 7	2.176E-01	1.800E-01	1.879E-01	1.879E-01	1.376E-01	1.437E-01	1.437E-01					
I= 8, J=1, 8	2.221E-01	2.072E-01	2.127E-01	2.127E-01	1.463E-01	1.539E-01	1.539E-01	1.721E-01				
I= 9, J=1, 9	2.221E-01	2.072E-01	2.127E-01	2.127E-01	1.463E-01	1.539E-01	1.539E-01	1.721E-01	1.721E-01			
I=10, J=1,10	1.153E-01	1.027E-01	1.048E-01	1.048E-01	8.981E-02	9.139E-02	9.139E-02	9.433E-02	9.433E-02	7.454E-02		
I=11, J=1,11	1.230E-01 7.787E-02	1.080E-01	1.110E-01	1.110E-01	9.302E-02	9.499E-02	9.499E-02	9.825E-02	9.825E-02	7.608E-02		
I=12, J=1,12	1.230E-01 7.787E-02	1.080E-01 7.787E-02	1.110E-01	1.110E-01	9.302E-02	9.499E-02	9.499E-02	9.825E-02	9.825E-02	7.608E-02		
I=13, J=1,13	1.249E-01 8.102E-02	1.181E-01 8.102E-02	1.205E-01 8.535E-02	1.205E-01	9.974E-02	1.017E-01	1.017E-01	1.066E-01	1.066E-01	7.894E-02		
I=14, J=1,14	1.249E-01 8.102E-02	1.181E-01 8.102E-02	1.205E-01 8.535E-02	1.205E-01 8.535E-02	9.974E-02	1.017E-01	1.017E-01	1.066E-01	1.066E-01	7.894E-02		
I=15, J=1,15	1.250E-01 8.535E-02	1.242E-01 8.535E-02	1.246E-01 9.063E-02	1.246E-01 9.063E-02	1.119E-01 1.004E-01	1.142E-01	1.142E-01	1.188E-01	1.188E-01	8.294E-02		
I=16, J=1,16	1.250E-01 8.535E-02	1.242E-01 8.535E-02	1.246E-01 9.063E-02	1.246E-01 9.063E-02	1.119E-01 1.004E-01	1.142E-01	1.142E-01	1.188E-01	1.188E-01	8.294E-02		
I=17, J=1,17	7.504E-02 5.626E-02	6.869E-02 5.626E-02	6.974E-02 5.745E-02	6.974E-02 5.745E-02	6.238E-02 5.917E-02	6.314E-02 5.917E-02	6.314E-02 4.766E-02	6.455E-02	6.455E-02	5.563E-02		
I=18, J=1,18	7.499E-02 5.754E-02	7.145E-02 5.754E-02	7.296E-02 5.882E-02	7.296E-02 5.882E-02	6.419E-02 6.063E-02	6.512E-02 6.063E-02	6.512E-02 4.829E-02	6.667E-02 4.900E-02	6.667E-02	5.682E-02		
I=19, J=1,19	7.499E-02 5.754E-02	7.145E-02 5.754E-02	7.296E-02 5.882E-02	7.296E-02 5.882E-02	6.419E-02 6.063E-02	6.512E-02 6.063E-02	6.512E-02 4.829E-02	6.667E-02 4.900E-02	6.667E-02	5.682E-02		
I=20, J=1,20	7.995E-02 5.999E-02	7.641E-02 5.999E-02	7.762E-02 6.163E-02	7.762E-02 6.163E-02	6.778E-02 6.370E-02	6.871E-02 6.370E-02	6.871E-02 4.950E-02	7.091E-02 5.028E-02	7.091E-02	5.923E-02 5.187E-02		

Table IV (Continued)

I=21, J=1,21	7.995E-02 5.999E-02 5.187E-02	7.641E-02 5.999E-02 5.187E-02	7.762E-02 6.163E-02	7.762E-02 6.163E-02	6.778E-02 6.370E-02	6.871E-02 6.370E-02	6.871E-02 4.950E-02	7.091E-02 5.028E-02	7.091E-02 5.028E-02	5.923E-02 5.187E-02
I=22, J=1,22	8.000E-02 6.402E-02 5.392E-02	7.946E-02 6.402E-02 5.583E-02	7.970E-02 6.570E-02	7.970E-02 6.570E-02	7.304E-02 6.874E-02	7.410E-02 6.874E-02	7.410E-02 5.120E-02	7.638E-02 5.208E-02	7.638E-02 5.208E-02	6.320E-02 5.392E-02
I=23, J=1,23	8.000E-02 6.402E-02 5.392E-02	7.946E-02 6.402E-02 5.683E-02	7.970E-02 6.570E-02 5.683E-02	7.970E-02 6.570E-02	7.304E-02 6.874E-02	7.410E-02 6.874E-02	7.410E-02 5.120E-02	7.638E-02 5.208E-02	7.638E-02 5.208E-02	6.320E-02 5.392E-02
I=24, J=1,24	8.000E-02 7.019E-02 5.644E-02	7.998E-02 7.019E-02 5.997E-02	7.999E-02 7.239E-02 5.997E-02	7.999E-02 7.239E-02 6.590E-02	7.859E-02 7.576E-02	7.893E-02 7.576E-02	7.893E-02 5.335E-02	7.949E-02 5.434E-02	7.949E-02 5.434E-02	6.911E-02 5.644E-02
I=25, J=1,25	8.000E-02 7.019E-02 5.644E-02	7.998E-02 7.019E-02 5.997E-02	7.999E-02 7.239E-02 5.997E-02	7.999E-02 7.239E-02 6.590E-02	7.859E-02 7.576E-02	7.893E-02 7.576E-02	7.893E-02 5.335E-02	7.949E-02 5.434E-02	7.949E-02 5.434E-02	6.911E-02 5.644E-02
I=26, J=1,26	5.269E-02 4.211E-02 3.864E-02	4.904E-02 4.211E-02 3.947E-02	4.964E-02 4.275E-02 3.947E-02	4.964E-02 4.275E-02 4.054E-02	4.547E-02 4.368E-02 4.054E-02	4.590E-02 4.368E-02 3.308E-02	4.590E-02 3.776E-02	4.669E-02 3.806E-02	4.669E-02 3.806E-02	4.176E-02 3.864E-02
I=27, J=1,27	5.497E-02 4.292E-02 3.923E-02	5.065E-02 4.292E-02 4.009E-02	5.151E-02 4.361E-02 4.009E-02	5.151E-02 4.361E-02 4.120E-02	4.656E-02 4.458E-02 4.120E-02	4.708E-02 4.458E-02 3.339E-02	4.708E-02 3.829E-02 3.372E-02	4.795E-02 3.862E-02	4.795E-02 3.862E-02	4.253E-02 3.923E-02
I=28, J=1,28	5.497E-02 4.292E-02 3.923E-02	5.065E-02 4.292E-02 4.009E-02	5.151E-02 4.361E-02 4.009E-02	5.151E-02 4.361E-02 4.120E-02	4.656E-02 4.458E-02 4.120E-02	4.708E-02 4.458E-02 3.339E-02	4.708E-02 3.829E-02 3.372E-02	4.795E-02 3.862E-02 3.372E-02	4.795E-02 3.862E-02 3.372E-02	4.253E-02 3.923E-02
I=29, J=1,29	5.553E-02 4.446E-02 4.043E-02	5.346E-02 4.446E-02 4.138E-02	5.416E-02 4.533E-02 4.138E-02	5.416E-02 4.533E-02 4.258E-02	4.866E-02 4.642E-02 4.258E-02	4.917E-02 4.642E-02 3.398E-02	4.917E-02 3.936E-02 3.434E-02	5.038E-02 3.971E-02 3.434E-02	5.038E-02 3.971E-02 3.506E-02	4.406E-02 4.043E-02
I=30, J=1,30	5.552E-02 4.446E-02 4.043E-02	5.346E-02 4.446E-02 4.138E-02	5.416E-02 4.533E-02 4.138E-02	5.416E-02 4.533E-02 4.258E-02	4.866E-02 4.642E-02 4.258E-02	4.917E-02 4.642E-02 3.398E-02	4.917E-02 3.936E-02 3.434E-02	5.038E-02 3.971E-02 3.434E-02	5.038E-02 3.971E-02 3.506E-02	4.406E-02 4.043E-02 3.506E-02
I=31, J=1,31	5.556E-02 4.986E-02 4.474E-02 4.067E-02	5.553E-02 4.986E-02 4.604E-02	5.554E-02 5.089E-02 4.604E-02	5.554E-02 5.089E-02 4.805E-02	5.443E-02 5.271E-02 4.805E-02	5.469E-02 5.271E-02 3.589E-02	5.469E-02 4.347E-02 3.633E-02	5.513E-02 4.390E-02 3.633E-02	5.513E-02 4.390E-02 3.723E-02	4.938E-02 4.474E-02 3.723E-02
I=32, J=1,32	3.902E-02 3.244E-02 3.037E-02 2.879E-02	3.673E-02 3.244E-02 3.086E-02 2.430E-02	3.710E-02 3.284E-02 3.086E-02	3.710E-02 3.284E-02 3.149E-02	3.451E-02 3.340E-02 3.149E-02	3.477E-02 3.340E-02 2.728E-02	3.477E-02 2.985E-02 2.744E-02	3.526E-02 3.003E-02 2.744E-02	3.526E-02 3.003E-02 2.775E-02	3.224E-02 3.037E-02 2.775E-02

Table IV (Continued)

I=33, J=1,33	4.082E-02	4.082E-02	4.082E-02	4.082E-02	4.071E-02	4.074E-02	4.074E-02	4.074E-02	4.079E-02	4.079E-02	3.922E-02
	3.943E-02	3.943E-02	3.942E-02	3.982E-02	4.034E-02	4.034E-02	3.560E-02	3.583E-02	3.583E-02	3.633E-02	3.633E-02
	3.633E-02	3.717E-02	3.717E-02	3.856E-02	3.856E-02	3.163E-02	3.187E-02	3.187E-02	3.236E-02	3.236E-02	3.236E-02
	3.410E-02	2.656E-02	3.060E-02								
I=34, J=1,34	3.126E-02	3.124E-02	3.124E-02	3.124E-02	3.067E-02	3.080E-02	3.080E-02	3.102E-02	3.102E-02	2.870E-02	
	2.887E-02	2.887E-02	2.924E-02	2.924E-02	2.995E-02	2.995E-02	2.660E-02	2.675E-02	2.675E-02	2.706E-02	
	2.706E-02	2.754E-02	2.754E-02	2.819E-02	2.819E-02	2.445E-02	2.457E-02	2.457E-02	2.483E-02	2.483E-02	
	2.576E-02	2.218E-02	2.390E-02	2.077E-02							
I=35, J=1,35	2.470E-02	2.469E-02	2.469E-02	2.469E-02	2.462E-02	2.464E-02	2.464E-02	2.467E-02	2.467E-02	2.381E-02	
	2.391E-02	2.391E-02	2.411E-02	2.411E-02	2.440E-02	2.440E-02	2.234E-02	2.243E-02	2.243E-02	2.263E-02	
	2.263E-02	2.295E-02	2.295E-02	2.353E-02	2.353E-02	2.079E-02	2.088E-02	2.088E-02	2.106E-02	2.106E-02	
	2.176E-02	1.921E-02	2.046E-02	1.829E-02	1.677E-02						
I=36, J=1,36	2.001E-02	2.000E-02	2.000E-02	2.000E-02	1.994E-02	1.996E-02	1.996E-02	1.998E-02	1.998E-02	1.934E-02	
	1.941E-02	1.941E-02	1.956E-02	1.956E-02	1.977E-02	1.977E-02	1.830E-02	1.837E-02	1.837E-02	1.850E-02	
	1.850E-02	1.873E-02	1.873E-02	1.913E-02	1.913E-02	1.722E-02	1.728E-02	1.728E-02	1.740E-02	1.740E-02	
	1.789E-02	1.613E-02	1.699E-02	1.552E-02	1.455E-02	1.323E-02					
I=37, J=1,37	1.654E-02	1.653E-02	1.653E-02	1.653E-02	1.652E-02	1.653E-02	1.653E-02	1.653E-02	1.653E-02	1.637E-02	
	1.640E-02	1.640E-02	1.644E-02	1.644E-02	1.649E-02	1.649E-02	1.573E-02	1.578E-02	1.578E-02	1.588E-02	
	1.588E-02	1.604E-02	1.604E-02	1.627E-02	1.627E-02	1.494E-02	1.499E-02	1.499E-02	1.508E-02	1.508E-02	
	1.541E-02	1.411E-02	1.477E-02	1.364E-02	1.291E-02	1.196E-02	1.112E-02				
I=38, J=1,38	1.390E-02	1.389E-02	1.389E-02	1.389E-02	1.388E-02	1.389E-02	1.389E-02	1.389E-02	1.389E-02	1.376E-02	
	1.378E-02	1.378E-02	1.382E-02	1.382E-02	1.386E-02	1.386E-02	1.327E-02	1.330E-02	1.330E-02	1.338E-02	
	1.338E-02	1.350E-02	1.350E-02	1.368E-02	1.368E-02	1.267E-02	1.271E-02	1.271E-02	1.277E-02	1.277E-02	
	1.303E-02	1.205E-02	1.255E-02	1.171E-02	1.117E-02	1.049E-02	9.925E-03	9.156E-03			
I=39, J=1,39	1.184E-02	1.183E-02	1.183E-02	1.183E-02	1.183E-02	1.183E-02	1.183E-02	1.183E-02	1.183E-02	1.182E-02	
	1.182E-02	1.182E-02	1.182E-02	1.182E-02	1.183E-02	1.183E-02	1.161E-02	1.163E-02	1.163E-02	1.167E-02	
	1.167E-02	1.172E-02	1.172E-02	1.179E-02	1.179E-02	1.116E-02	1.119E-02	1.119E-02	1.124E-02	1.124E-02	
	1.143E-02	1.068E-02	1.106E-02	1.040E-02	9.982E-03	9.443E-03	9.000E-03	8.423E-03	7.916E-03		
I=40, J=1,40	1.021E-02	1.021E-02	1.020E-02	1.020E-02	1.020E-02	1.020E-02	1.020E-02	1.020E-02	1.020E-02	1.019E-02	
	1.019E-02	1.019E-02	1.020E-02	1.020E-02	1.020E-02	1.020E-02	1.001E-02	1.003E-02	1.003E-02	1.006E-02	
	1.006E-02	1.011E-02	1.011E-02	1.016E-02	1.016E-02	9.666E-03	9.684E-03	9.684E-03	9.722E-03	9.722E-03	
	9.875E-03	9.288E-03	9.585E-03	9.070E-03	8.742E-03	8.327E-03	7.990E-03	7.559E-03	7.197E-03	6.712E-03	
I=41, J=1,41	8.897E-03	8.890E-03	8.889E-03	8.889E-03	8.889E-03	8.889E-03	8.889E-03	8.889E-03	8.889E-03	8.887E-03	
	8.887E-03	8.887E-03	8.888E-03	8.888E-03	8.889E-03	8.889E-03	8.841E-03	8.847E-03	8.847E-03	8.857E-03	
	8.857E-03	8.871E-03	8.871E-03	8.882E-03	8.882E-03	8.627E-03	8.641E-03	8.641E-03	8.669E-03	8.669E-03	
	8.769E-03	8.337E-03	8.560E-03	8.155E-03	7.888E-03	7.545E-03	7.269E-03	6.918E-03	6.628E-03	6.251E-03	

Table IV (Continued)

I=42, J=1,42	7.819E-03	7.813E-03	7.813E-03	7.813E-03	7.813E-03	7.813E-03	7.813E-03	7.813E-03	7.813E-03	7.813E-03	7.811E-03
	7.811E-03	7.811E-03	7.812E-03	7.812E-03	7.812E-03	7.812E-03	7.771E-03	7.776E-03	7.776E-03	7.776E-03	7.785E-03
	7.785E-03	7.796E-03	7.796E-03	7.807E-03	7.807E-03	7.807E-03	7.593E-03	7.604E-03	7.604E-03	7.627E-03	7.627E-03
	7.710E-03	7.357E-03	7.539E-03	7.210E-03	6.994E-03	6.718E-03	6.497E-03	6.219E-03	5.991E-03	5.701E-03	5.701E-03
	5.456E-03	5.130E-03									
I=43, J=1,43	6.925E-03	6.921E-03	6.920E-03	6.920E-03	6.920E-03	6.920E-03	6.920E-03	6.920E-03	6.920E-03	6.920E-03	6.920E-03
	6.920E-03	6.920E-03	6.920E-03	6.920E-03	6.920E-03	6.920E-03	6.913E-03	6.914E-03	6.914E-03	6.914E-03	6.916E-03
	6.916E-03	6.918E-03	6.918E-03	6.920E-03	6.920E-03	6.920E-03	6.838E-03	6.845E-03	6.845E-03	6.857E-03	6.857E-03
	6.893E-03	6.660E-03	6.800E-03	6.545E-03	6.365E-03	6.136E-03	5.950E-03	5.714E-03	5.524E-03	5.282E-03	5.282E-03
	5.081E-03	4.822E-03	4.594E-03								
I=44, J=1,44	6.175E-03	6.173E-03	6.173E-03	6.173E-03	6.173E-03	6.173E-03	6.173E-03	6.173E-03	6.173E-03	6.173E-03	6.173E-03
	6.173E-03	6.173E-03	6.173E-03	6.173E-03	6.173E-03	6.173E-03	6.166E-03	6.167E-03	6.167E-03	6.167E-03	6.169E-03
	6.169E-03	6.171E-03	6.171E-03	6.172E-03	6.172E-03	6.172E-03	6.101E-03	6.107E-03	6.107E-03	6.117E-03	6.117E-03
	6.149E-03	5.952E-03	6.049E-03	5.855E-03	5.706E-03	5.517E-03	5.363E-03	5.169E-03	5.014E-03	4.818E-03	4.818E-03
	4.656E-03	4.451E-03	4.278E-03	4.048E-03							
I=45, J=1,45	5.539E-03	5.540E-03	5.541E-03	5.541E-03	5.540E-03	5.541E-03	5.541E-03	5.541E-03	5.540E-03	5.540E-03	5.540E-03
	5.540E-03	5.540E-03	5.540E-03	5.540E-03	5.540E-03	5.540E-03	5.539E-03	5.540E-03	5.540E-03	5.540E-03	5.540E-03
	5.540E-03	5.540E-03	5.540E-03	5.540E-03	5.540E-03	5.540E-03	5.521E-03	5.523E-03	5.523E-03	5.527E-03	5.527E-03
	5.535E-03	5.432E-03	5.505E-03	5.353E-03	5.235E-03	5.074E-03	4.943E-03	4.777E-03	4.643E-03	4.474E-03	4.474E-03
	4.337E-03	4.164E-03	4.019E-03	3.833E-03	3.669E-03						
I=46, J=1,46	4.997E-03	5.000E-03	5.002E-03	5.002E-03	5.001E-03	5.002E-03	5.002E-03	5.002E-03	5.001E-03	5.001E-03	5.001E-03
	5.002E-03	5.002E-03	5.001E-03	5.001E-03	5.001E-03	5.001E-03	5.001E-03	5.001E-03	5.001E-03	5.001E-03	5.001E-03
	5.001E-03	5.001E-03	5.001E-03	5.001E-03	5.001E-03	5.001E-03	4.984E-03	4.986E-03	4.986E-03	4.989E-03	4.989E-03
	4.997E-03	4.907E-03	4.970E-03	4.839E-03	4.739E-03	4.603E-03	4.492E-03	4.352E-03	4.240E-03	4.099E-03	4.099E-03
	3.984E-03	3.841E-03	3.722E-03	3.572E-03	3.444E-03						
I=47, J=1,47	4.531E-03	4.538E-03	4.541E-03	4.541E-03	4.540E-03	4.541E-03	4.541E-03	4.541E-03	4.540E-03	4.540E-03	4.540E-03
	4.540E-03	4.540E-03	4.540E-03	4.540E-03	4.540E-03	4.540E-03	4.540E-03	4.540E-03	4.540E-03	4.540E-03	4.540E-03
	4.540E-03	4.540E-03	4.540E-03	4.540E-03	4.540E-03	4.537E-03	4.537E-03	4.537E-03	4.537E-03	4.538E-03	4.538E-03
	4.540E-03	4.504E-03	4.532E-03	4.456E-03	4.375E-03	4.262E-03	4.168E-03	4.046E-03	3.948E-03	3.825E-03	3.825E-03
	3.725E-03	3.599E-03	3.447E-03	3.368E-03	3.259E-03	3.121E-03	3.001E-03				
I=48, J=1,48	4.142E-03	4.153E-03	4.156E-03	4.156E-03	4.155E-03	4.156E-03	4.156E-03	4.156E-03	4.156E-03	4.156E-03	4.155E-03
	4.156E-03	4.156E-03	4.156E-03	4.156E-03	4.156E-03	4.156E-03	4.156E-03	4.156E-03	4.156E-03	4.156E-03	4.156E-03
	4.156E-03	4.156E-03	4.156E-03	4.156E-03	4.156E-03	4.153E-03	4.153E-03	4.153E-03	4.154E-03	4.154E-03	4.154E-03
	4.155E-03	4.123E-03	4.148E-03	4.080E-03	4.009E-03	3.912E-03	3.829E-03	3.724E-03	3.639E-03	3.533E-03	3.533E-03
	3.447E-03	3.340E-03	3.253E-03	3.143E-03	3.053E-03	2.938E-03	2.842E-03	2.720E-03			
I=49, J=1,49	3.820E-03	3.834E-03	3.839E-03	3.839E-03	3.837E-03	3.838E-03	3.838E-03	3.838E-03	3.838E-03	3.838E-03	3.838E-03
	3.838E-03	3.838E-03	3.838E-03	3.838E-03	3.838E-03	3.838E-03	3.838E-03	3.838E-03	3.838E-03	3.838E-03	3.838E-03
	3.838E-03	3.838E-03	3.838E-03	3.838E-03	3.838E-03	3.838E-03	3.838E-03	3.838E-03	3.838E-03	3.838E-03	3.838E-03
	3.838E-03	3.829E-03	3.837E-03	3.807E-03	3.752E-03	3.671E-03	3.599E-03	3.506E-03	3.430E-03	3.335E-03	3.335E-03
	3.257E-03	3.161E-03	3.082E-03	2.984E-03	2.904E-03	2.802E-03	2.718E-03	2.614E-03	2.531E-03		

TABLE V

Relativistic, hydrogenic $F_{1j}^{(0)}$ for $Z = 30$

[illegible]

Table V (Continued)

I=21, J=1,21	2.407E+00 1.809E+00 1.560E+00	2.303E+00 1.805E+00	2.339E+00 1.855E+00	2.337E+00 1.854E+00	2.043E+00 1.916E+00	2.071E+00 1.915E+00	2.068E+00 1.494E+00	2.135E+00 1.518E+00	2.133E+00 1.513E+00	1.785E+00 1.561E+00
I=22, J=1,22	2.409E+00 1.930E+00 1.622E+00	2.343E+00 1.927E+00 1.709E+00	2.400E+00 1.978E+00	2.399E+00 1.976E+00	2.202E+00 2.068E+00	2.234E+00 2.067E+00	2.230E+00 1.546E+00	2.299E+00 1.573E+00	2.298E+00 1.568E+00	1.906E+00 1.623E+00
I=23, J=1,23	2.405E+00 1.929E+00 1.621E+00	2.389E+00 1.925E+00 1.708E+00	2.396E+00 1.976E+00 1.707E+00	2.396E+00 1.975E+00	2.200E+00 2.066E+00	2.232E+00 2.065E+00	2.228E+00 1.545E+00	2.297E+00 1.572E+00	2.296E+00 1.567E+00	1.904E+00 1.623E+00
I=24, J=1,24	2.405E+00 2.117E+00 1.697E+00	2.404E+00 2.111E+00 1.803E+00	2.404E+00 2.177E+00 1.802E+00	2.404E+00 2.176E+00 1.980E+00	2.364E+00 2.277E+00	2.374E+00 2.277E+00	2.373E+00 1.611E+00	2.389E+00 1.641E+00	2.389E+00 1.635E+00	2.084E+00 1.699E+00
I=25, J=1,25	2.402E+00 2.115E+00 1.696E+00	2.402E+00 2.110E+00 1.802E+00	2.402E+00 2.176E+00 1.801E+00	2.402E+00 2.175E+00 1.980E+00	2.362E+00 2.276E+00 1.979E+00	2.372E+00 2.275E+00	2.371E+00 1.611E+00	2.387E+00 1.641E+00	2.387E+00 1.635E+00	2.083E+00 1.698E+00
I=26, J=1,26	1.599E+00 1.274E+00 1.166E+00	1.486E+00 1.272E+00 1.192E+00	1.504E+00 1.292E+00 1.191E+00	1.502E+00 1.291E+00 1.224E+00	1.376E+00 1.320E+00 1.224E+00	1.389E+00 1.319E+00 9.998E-01	1.388E+00 1.142E+00	1.412E+00 1.151E+00	1.411E+00 1.149E+00	1.263E+00 1.167E+00
I=27, J=1,27	1.670E+00 1.299E+00 1.184E+00	1.535E+00 1.297E+00 1.211E+00	1.562E+00 1.318E+00 1.210E+00	1.559E+00 1.318E+00 1.244E+00	1.410E+00 1.347E+00 1.244E+00	1.426E+00 1.347E+00 1.009E+00	1.424E+00 1.158E+00 1.019E+00	1.450E+00 1.168E+00	1.450E+00 1.166E+00	1.287E+00 1.185E+00
I=28, J=1,28	1.659E+00 1.294E+00 1.181E+00	1.529E+00 1.293E+00 1.207E+00	1.555E+00 1.313E+00 1.206E+00	1.553E+00 1.313E+00 1.240E+00	1.404E+00 1.342E+00 1.240E+00	1.420E+00 1.342E+00 1.007E+00	1.419E+00 1.155E+00 1.017E+00	1.445E+00 1.165E+00 1.015E+00	1.444E+00 1.163E+00	1.282E+00 1.181E+00
I=29, J=1,29	1.676E+00 1.341E+00 1.217E+00	1.613E+00 1.339E+00 1.246E+00	1.635E+00 1.365E+00 1.245E+00	1.633E+00 1.365E+00 1.281E+00	1.468E+00 1.398E+00 1.281E+00	1.484E+00 1.398E+00 1.025E+00	1.482E+00 1.187E+00 1.036E+00	1.518E+00 1.198E+00 1.034E+00	1.518E+00 1.196E+00 1.056E+00	1.329E+00 1.218E+00
I=30, J=1,30	1.671E+00 1.339E+00 1.216E+00	1.611E+00 1.338E+00 1.244E+00	1.632E+00 1.364E+00 1.244E+00	1.630E+00 1.363E+00 1.280E+00	1.466E+00 1.396E+00 1.280E+00	1.481E+00 1.396E+00 1.025E+00	1.480E+00 1.186E+00 1.035E+00	1.516E+00 1.197E+00 1.033E+00	1.515E+00 1.195E+00 1.055E+00	1.327E+00 1.216E+00 1.054E+00
I=31, J=1,31	1.670E+00 1.501E+00 1.345E+00 1.222E+00	1.669E+00 1.499E+00 1.384E+00	1.670E+00 1.531E+00 1.383E+00	1.670E+00 1.530E+00 1.444E+00	1.637E+00 1.584E+00 1.444E+00	1.645E+00 1.584E+00 1.083E+00	1.644E+00 1.310E+00 1.096E+00	1.657E+00 1.322E+00 1.093E+00	1.657E+00 1.320E+00 1.120E+00	1.487E+00 1.346E+00 1.119E+00
I=32, J=1,32	1.182E+00 9.806E-01 9.164E-01 8.683E-01	1.111E+00 9.797E-01 9.313E-01 7.336E-01	1.123E+00 9.917E-01 9.311E-01	1.122E+00 9.913E-01 9.503E-01	1.043E+00 1.008E+00 9.502E-01	1.051E+00 1.008E+00 8.241E-01	1.050E+00 9.020E-01 8.290E-01	1.065E+00 9.074E-01 8.279E-01	1.065E+00 9.065E-01 8.374E-01	9.743E-01 9.168E-01 8.370E-01

I=33, J=1,33	1.226E+00	1.226E+00	1.226E+00	1.226E+00	1.223E+00	1.224E+00	1.224E+00	1.225E+00	1.225E+00	1.180E+00
	1.186E+00	1.185E+00	1.196E+00	1.196E+00	1.212E+00	1.212E+00	1.071E+00	1.074E+00	1.077E+00	1.092E+00
	1.091E+00	1.117E+00	1.117E+00	1.158E+00	1.158E+00	9.524E-01	9.597E-01	9.580E-01	9.728E-01	9.723E-01
	1.024E+00	8.004E-01	9.148E-01							
I=34, J=1,34	9.395E-01	9.389E-01	9.391E-01	9.390E-01	9.224E-01	9.261E-01	9.256E-01	9.323E-01	9.322E-01	8.635E-01
	8.686E-01	8.678E-01	8.791E-01	8.788E-01	9.000E-01	8.998E-01	8.004E-01	8.049E-01	8.041E-01	8.134E-01
	8.131E-01	8.275E-01	8.273E-01	8.471E-01	8.469E-01	7.356E-01	7.394E-01	7.386E-01	7.463E-01	7.460E-01
	7.738E-01	6.675E-01	7.177E-01	6.240E-01						
I=35, J=1,35	7.419E-01	7.417E-01	7.417E-01	7.417E-01	7.396E-01	7.401E-01	7.401E-01	7.410E-01	7.410E-01	7.159E-01
	7.189E-01	7.184E-01	7.244E-01	7.242E-01	7.329E-01	7.328E-01	6.718E-01	6.745E-01	6.740E-01	6.798E-01
	6.796E-01	6.895E-01	6.894E-01	7.066E-01	7.065E-01	6.253E-01	6.279E-01	6.273E-01	6.328E-01	6.326E-01
	6.534E-01	5.778E-01	6.144E-01	5.492E-01	5.035E-01					
I=36, J=1,36	6.010E-01	6.007E-01	6.007E-01	6.007E-01	5.991E-01	5.995E-01	5.995E-01	6.002E-01	6.002E-01	5.813E-01
	5.835E-01	5.831E-01	5.875E-01	5.874E-01	5.939E-01	5.939E-01	5.502E-01	5.522E-01	5.518E-01	5.559E-01
	5.557E-01	5.626E-01	5.625E-01	5.747E-01	5.746E-01	5.176E-01	5.195E-01	5.191E-01	5.228E-01	5.227E-01
	5.373E-01	4.850E-01	5.101E-01	4.661E-01	4.370E-01	3.972E-01				
I=37, J=1,37	4.966E-01	4.963E-01	4.963E-01	4.963E-01	4.962E-01	4.962E-01	4.962E-01	4.963E-01	4.962E-01	4.918E-01
	4.925E-01	4.924E-01	4.937E-01	4.937E-01	4.952E-01	4.952E-01	4.727E-01	4.741E-01	4.738E-01	4.768E-01
	4.767E-01	4.816E-01	4.815E-01	4.885E-01	4.885E-01	4.491E-01	4.504E-01	4.501E-01	4.527E-01	4.527E-01
	4.627E-01	4.239E-01	4.435E-01	4.094E-01	3.876E-01	3.590E-01	3.339E-01			
I=38, J=1,38	4.173E-01	4.170E-01	4.170E-01	4.170E-01	4.169E-01	4.159E-01	4.169E-01	4.170E-01	4.170E-01	4.133E-01
	4.139E-01	4.138E-01	4.149E-01	4.149E-01	4.161E-01	4.151E-01	3.986E-01	3.997E-01	3.994E-01	4.017E-01
	4.016E-01	4.054E-01	4.053E-01	4.108E-01	4.107E-01	3.818E-01	3.818E-01	3.816E-01	3.836E-01	3.836E-01
	3.911E-01	3.622E-01	3.767E-01	3.514E-01	3.355E-01	3.150E-01	2.979E-01	2.748E-01		
I=39, J=1,39	3.555E-01	3.553E-01	3.552E-01	3.552E-01	3.553E-01	3.552E-01	3.552E-01	3.552E-01	3.552E-01	3.547E-01
	3.548E-01	3.548E-01	3.550E-01	3.550E-01	3.552E-01	3.552E-01	3.486E-01	3.492E-01	3.491E-01	3.503E-01
	3.503E-01	3.520E-01	3.520E-01	3.539E-01	3.538E-01	3.354E-01	3.361E-01	3.359E-01	3.374E-01	3.373E-01
	3.432E-01	3.210E-01	3.321E-01	3.123E-01	2.996E-01	2.835E-01	2.701E-01	2.528E-01	2.376E-01	
I=40, J=1,40	3.066E-01	3.063E-01	3.063E-01	3.063E-01	3.063E-01	3.063E-01	3.063E-01	3.063E-01	3.063E-01	3.058E-01
	3.059E-01	3.059E-01	3.061E-01	3.061E-01	3.062E-01	3.062E-01	3.008E-01	3.013E-01	3.012E-01	3.022E-01
	3.021E-01	3.036E-01	3.035E-01	3.051E-01	3.051E-01	2.904E-01	2.909E-01	2.908E-01	2.919E-01	2.919E-01
	2.965E-01	2.790E-01	2.877E-01	2.723E-01	2.624E-01	2.499E-01	2.398E-01	2.269E-01	2.160E-01	2.014E-01
I=41, J=1,41	2.670E-01	2.668E-01	2.668E-01	2.668E-01	2.668E-01	2.668E-01	2.668E-01	2.668E-01	2.668E-01	2.667E-01
	2.668E-01	2.668E-01	2.668E-01	2.668E-01	2.668E-01	2.668E-01	2.654E-01	2.654E-01	2.655E-01	2.659E-01
	2.659E-01	2.662E-01	2.662E-01	2.666E-01	2.666E-01	2.591E-01	2.595E-01	2.594E-01	2.602E-01	2.602E-01
	2.632E-01	2.504E-01	2.564E-01	2.448E-01	2.367E-01	2.264E-01	2.182E-01	2.076E-01	1.989E-01	1.876E-01
	1.777E-01									

Table V (Continued)

I=42, J=1.42	2.347E-01	2.345E-01	2.345E-01	2.345E-01	2.345E-01	2.345E-01	2.345E-01	2.345E-01	2.345E-01	2.345E-01	2.344E-01
	2.344E-01	2.344E-01	2.345E-01	2.345E-01	2.345E-01	2.345E-01	2.345E-01	2.333E-01	2.334E-01	2.334E-01	2.337E-01
	2.337E-01	2.340E-01	2.340E-01	2.343E-01	2.343E-01	2.280E-01	2.283E-01	2.283E-01	2.290E-01	2.283E-01	2.289E-01
	2.314E-01	2.209E-01	2.263E-01	2.164E-01	2.099E-01	2.016E-01	1.950E-01	1.866E-01	1.798E-01	1.711E-01	
I=43, J=1.43	2.078E-01	2.077E-01	2.077E-01	2.077E-01	2.077E-01	2.077E-01	2.077E-01	2.077E-01	2.077E-01	2.077E-01	2.077E-01
	2.077E-01	2.077E-01	2.077E-01	2.077E-01	2.077E-01	2.077E-01	2.075E-01	2.075E-01	2.075E-01	2.075E-01	2.076E-01
	2.076E-01	2.076E-01	2.076E-01	2.077E-01	2.077E-01	2.053E-01	2.055E-01	2.054E-01	2.058E-01	2.058E-01	2.058E-01
	2.069E-01	2.000E-01	2.041E-01	1.964E-01	1.910E-01	1.842E-01	1.786E-01	1.715E-01	1.658E-01	1.585E-01	
I=44, J=1.44	1.853E-01	1.852E-01	1.853E-01	1.853E-01	1.852E-01	1.853E-01	1.853E-01	1.852E-01	1.852E-01	1.852E-01	1.852E-01
	1.852E-01	1.852E-01	1.852E-01	1.852E-01	1.852E-01	1.852E-01	1.851E-01	1.851E-01	1.851E-01	1.851E-01	1.851E-01
	1.851E-01	1.852E-01	1.852E-01	1.852E-01	1.852E-01	1.832E-01	1.833E-01	1.833E-01	1.836E-01	1.836E-01	1.836E-01
	1.845E-01	1.787E-01	1.821E-01	1.757E-01	1.713E-01	1.656E-01	1.609E-01	1.551E-01	1.505E-01	1.446E-01	
I=45, J=1.45	1.662E-01	1.662E-01	1.663E-01	1.663E-01	1.662E-01	1.663E-01	1.663E-01	1.663E-01	1.663E-01	1.663E-01	1.663E-01
	1.663E-01	1.663E-01	1.663E-01	1.663E-01	1.663E-01	1.663E-01	1.662E-01	1.662E-01	1.662E-01	1.662E-01	1.662E-01
	1.662E-01	1.663E-01	1.662E-01	1.663E-01	1.663E-01	1.657E-01	1.658E-01	1.658E-01	1.659E-01	1.658E-01	1.658E-01
	1.661E-01	1.631E-01	1.652E-01	1.606E-01	1.571E-01	1.523E-01	1.483E-01	1.434E-01	1.393E-01	1.343E-01	
I=46, J=1.46	1.499E-01	1.500E-01	1.501E-01	1.501E-01	1.501E-01	1.501E-01	1.501E-01	1.501E-01	1.501E-01	1.501E-01	1.501E-01
	1.501E-01	1.501E-01	1.501E-01	1.501E-01	1.501E-01	1.501E-01	1.501E-01	1.501E-01	1.501E-01	1.501E-01	1.501E-01
	1.501E-01	1.501E-01	1.501E-01	1.501E-01	1.501E-01	1.496E-01	1.496E-01	1.496E-01	1.497E-01	1.497E-01	1.497E-01
	1.500E-01	1.473E-01	1.491E-01	1.452E-01	1.422E-01	1.381E-01	1.348E-01	1.306E-01	1.272E-01	1.230E-01	
I=47, J=1.47	1.359E-01	1.362E-01	1.363E-01	1.363E-01	1.362E-01	1.363E-01	1.363E-01	1.362E-01	1.362E-01	1.362E-01	1.362E-01
	1.363E-01	1.363E-01	1.362E-01	1.362E-01	1.362E-01	1.362E-01	1.362E-01	1.362E-01	1.362E-01	1.362E-01	1.362E-01
	1.362E-01	1.362E-01	1.362E-01	1.362E-01	1.362E-01	1.361E-01	1.362E-01	1.362E-01	1.362E-01	1.362E-01	1.362E-01
	1.362E-01	1.352E-01	1.360E-01	1.337E-01	1.313E-01	1.279E-01	1.251E-01	1.214E-01	1.185E-01	1.148E-01	
I=48, J=1.48	1.242E-01	1.246E-01	1.247E-01	1.247E-01	1.247E-01	1.247E-01	1.247E-01	1.247E-01	1.247E-01	1.247E-01	1.247E-01
	1.247E-01	1.247E-01	1.247E-01	1.247E-01	1.247E-01	1.247E-01	1.247E-01	1.247E-01	1.247E-01	1.247E-01	1.247E-01
	1.247E-01	1.247E-01	1.247E-01	1.247E-01	1.247E-01	1.246E-01	1.246E-01	1.246E-01	1.246E-01	1.246E-01	1.246E-01
	1.247E-01	1.237E-01	1.245E-01	1.225E-01	1.203E-01	1.174E-01	1.149E-01	1.118E-01	1.092E-01	1.060E-01	
I=49, J=1.49	1.145E-01	1.150E-01	1.152E-01	1.152E-01	1.151E-01	1.152E-01	1.152E-01	1.152E-01	1.152E-01	1.152E-01	1.151E-01
	1.152E-01	1.152E-01	1.152E-01	1.152E-01	1.152E-01	1.152E-01	1.152E-01	1.152E-01	1.152E-01	1.152E-01	1.152E-01
	1.152E-01	1.152E-01	1.152E-01	1.152E-01	1.152E-01	1.151E-01	1.152E-01	1.152E-01	1.152E-01	1.152E-01	1.152E-01
	1.152E-01	1.149E-01	1.151E-01	1.142E-01	1.126E-01	1.102E-01	1.080E-01	1.052E-01	1.029E-01	1.001E-01	
I=49, J=1.49	9.774E-02	9.484E-02	9.248E-02	8.954E-02	8.712E-02	8.408E-02	8.155E-02	7.844E-02	7.593E-02		

TABLE VI

Relativistic, hydrogenic $F_{1,1}^{(0)}$ for $Z = 56$

I= 1, J=1, 1	7.482E+01												
I= 2, J=1, 2	2.557E+01	1.861E+01											
I= 3, J=1, 3	2.994E+01	1.951E+01	2.205E+01										
I= 4, J=1, 4	2.782E+01	1.903E+01	2.174E+01	2.070E+01									
I= 5, J=1, 5	1.194E+01	9.972E+00	1.032E+01	1.020E+01	7.816E+00								
I= 6, J=1, 6	1.317E+01	1.071E+01	1.122E+01	1.107E+01	8.113E+00	8.499E+00							
I= 7, J=1, 7	1.254E+01	1.041E+01	1.090E+01	1.076E+01	7.988E+00	8.347E+00	8.206E+00						
I= 8, J=1, 8	1.279E+01	1.197E+01	1.228E+01	1.220E+01	8.527E+00	8.978E+00	8.795E+00	9.855E+00					
I= 9, J=1, 9	1.255E+01	1.181E+01	1.210E+01	1.202E+01	8.483E+00	8.925E+00	8.744E+00	9.784E+00	9.715E+00				
I=10, J=1,10	6.833E+00	6.032E+00	6.168E+00	6.122E+00	5.249E+00	5.347E+00	5.306E+00	5.485E+00	5.469E+00	4.340E+00			
I=11, J=1,11	7.337E+00 4.543E+00	6.359E+00	6.556E+00	6.496E+00	5.446E+00	5.569E+00	5.521E+00	5.719E+00	5.701E+00	4.434E+00			
I=12, J=1,12	7.076E+00 4.487E+00	6.216E+00 4.433E+00	6.405E+00	6.351E+00	5.345E+00	5.463E+00	5.418E+00	5.609E+00	5.591E+00	4.383E+00			
I=13, J=1,13	7.182E+00 4.680E+00	6.801E+00 4.615E+00	6.940E+00 4.866E+00	6.904E+00	5.737E+00	5.857E+00	5.808E+00	6.092E+00	6.070E+00	4.558E+00			
I=14, J=1,14	7.082E+00 4.661E+00	6.735E+00 4.548E+00	6.864E+00 4.864E+00	6.831E+00 4.823E+00	5.697E+00	5.815E+00	5.767E+00	6.049E+00	6.028E+00	4.541E+00			
I=15, J=1,15	7.087E+00 4.924E+00	7.049E+00 4.447E+00	7.066E+00 5.150E+00	7.062E+00 5.124E+00	6.405E+00 5.683E+00	6.531E+00	6.477E+00	6.738E+00	6.723E+00	4.784E+00			
I=16, J=1,16	7.037E+00 4.914E+00	7.002E+00 4.434E+00	7.018E+00 5.134E+00	7.014E+00 5.112E+00	6.378E+00 5.667E+00	6.502E+00 5.651E+00	6.448E+00	6.702E+00	6.688E+00	4.775E+00			
I=17, J=1,17	4.408E+00 3.262E+00	4.006E+00 3.242E+00	4.073E+00 3.314E+00	4.050E+00 3.307E+00	3.624E+00 3.409E+00	3.571E+00 3.404E+00	3.652E+00 2.756E+00	3.737E+00	3.729E+00	3.224E+00			
I=18, J=1,18	4.662E+00 3.340E+00	4.175E+00 3.314E+00	4.272E+00 3.344E+00	4.242E+00 3.387E+00	3.734E+00 3.494E+00	3.792E+00 3.490E+00	3.769E+00 2.794E+00	3.863E+00 2.836E+00	3.854E+00	3.296E+00			
I=19, J=1,19	4.530E+00 3.293E+00	4.094E+00 3.271E+00	4.142E+00 3.344E+00	4.165E+00 3.338E+00	3.674E+00 3.442E+00	3.730E+00 3.438E+00	3.709E+00 2.768E+00	3.799E+00 2.809E+00	3.791E+00	3.250E+00			
I=20, J=1,20	4.584E+00 3.436E+00	4.344E+00 3.413E+00	4.455E+00 3.508E+00	4.437E+00 3.499E+00	3.882E+00 3.419E+00	3.938E+00 3.614E+00	3.916E+00 2.841E+00	4.044E+00 2.886E+00	4.034E+00	3.391E+00			

Table VI (Continued)

I=21, J=1,21	4.533E+00 3.420E+00 2.929E+00	4.350E+00 3.397E+00	4.417E+00 3.491E+00	4.399E+00 3.482E+00	3.860E+00 3.601E+00	3.914E+00 3.596E+00	3.892E+00 2.832E+00	4.020E+00 2.877E+00	4.010E+00 2.848E+00	3.375E+00 2.938E+00
I=22, J=1,22	4.536E+00 3.651E+00 3.046E+00	4.508E+00 3.626E+00 3.211E+00	4.521E+00 3.722E+00	4.518E+00 3.714E+00	4.164E+00 3.887E+00	4.224E+00 3.881E+00	4.199E+00 2.935E+00	4.330E+00 2.986E+00	4.323E+00 2.952E+00	3.604E+00 3.057E+00
I=23, J=1,23	4.510E+00 3.641E+00 3.040E+00	4.485E+00 3.616E+00 3.205E+00	4.497E+00 3.712E+00 3.199E+00	4.493E+00 3.703E+00	4.150E+00 3.876E+00	4.209E+00 3.870E+00	4.184E+00 2.931E+00	4.312E+00 2.981E+00	4.305E+00 2.948E+00	3.594E+00 3.052E+00
I=24, J=1,24	4.510E+00 4.003E+00 3.183E+00	4.509E+00 3.964E+00 3.384E+00	4.510E+00 4.091E+00 3.376E+00	4.510E+00 4.081E+00 3.712E+00	4.442E+00 4.272E+00	4.459E+00 4.268E+00	4.451E+00 3.059E+00	4.482E+00 3.117E+00	4.481E+00 3.077E+00	3.944E+00 3.196E+00
I=25, J=1,25	4.495E+00 3.996E+00 3.180E+00	4.494E+00 3.961E+00 3.380E+00	4.495E+00 4.083E+00 3.373E+00	4.494E+00 4.073E+00 3.707E+00	4.429E+00 4.261E+00 3.702E+00	4.446E+00 4.257E+00	4.438E+00 3.057E+00	4.468E+00 3.114E+00	4.467E+00 3.074E+00	3.937E+00 3.193E+00
I=26, J=1,26	3.075E+00 2.431E+00 2.213E+00	2.845E+00 2.421E+00 2.262E+00	2.883E+00 2.459E+00 2.260E+00	2.870E+00 2.455E+00 2.323E+00	2.629E+00 2.510E+00 2.322E+00	2.656E+00 2.508E+00 1.903E+00	2.645E+00 2.176E+00	2.692E+00 2.194E+00	2.688E+00 2.183E+00	2.411E+00 2.217E+00
I=27, J=1,27	3.221E+00 2.480E+00 2.247E+00	2.943E+00 2.468E+00 2.298E+00	2.998E+00 2.509E+00 2.296E+00	2.981E+00 2.505E+00 2.361E+00	2.695E+00 2.563E+00 2.360E+00	2.728E+00 2.560E+00 1.922E+00	2.715E+00 2.208E+00 1.941E+00	2.767E+00 2.228E+00	2.762E+00 2.216E+00	2.456E+00 2.251E+00
I=28, J=1,28	3.144E+00 2.448E+00 2.222E+00	2.897E+00 2.437E+00 2.272E+00	2.951E+00 2.477E+00 2.269E+00	2.935E+00 2.473E+00 2.333E+00	2.658E+00 2.529E+00 2.331E+00	2.689E+00 2.527E+00 1.907E+00	2.677E+00 2.184E+00 1.926E+00	2.728E+00 2.203E+00 1.911E+00	2.723E+00 2.191E+00	2.425E+00 2.226E+00
I=29, J=1,29	3.176E+00 2.538E+00 2.290E+00	3.058E+00 2.526E+00 2.345E+00	3.100E+00 2.576E+00 2.343E+00	3.089E+00 2.571E+00 2.411E+00	2.779E+00 2.634E+00 2.410E+00	2.810E+00 2.632E+00 1.942E+00	2.798E+00 2.246E+00 1.963E+00	2.868E+00 2.266E+00 1.947E+00	2.862E+00 2.254E+00 1.988E+00	2.514E+00 2.295E+00
I=30, J=1,30	3.146E+00 2.527E+00 2.282E+00	3.039E+00 2.515E+00 2.336E+00	3.077E+00 2.565E+00 2.334E+00	3.067E+00 2.560E+00 2.402E+00	2.765E+00 2.623E+00 2.400E+00	2.796E+00 2.620E+00 1.938E+00	2.783E+00 2.238E+00 1.958E+00	2.854E+00 2.258E+00 1.942E+00	2.848E+00 2.245E+00 1.983E+00	2.503E+00 2.286E+00 1.978E+00
I=31, J=1,31	3.133E+00 2.830E+00 2.521E+00 2.290E+00	3.132E+00 2.815E+00 2.545E+00	3.132E+00 2.874E+00 2.592E+00	3.132E+00 2.859E+00 2.706E+00	3.077E+00 2.972E+00 2.704E+00	3.091E+00 2.969E+00 2.049E+00	3.085E+00 2.471E+00 2.074E+00	3.109E+00 2.495E+00 2.054E+00	3.108E+00 2.479E+00 2.105E+00	2.803E+00 2.526E+00 2.099E+00
I=32, J=1,32	2.266E+00 1.867E+00 1.737E+00 1.444E+00	2.121E+00 1.860E+00 1.766E+00 1.393E+00	2.145E+00 1.884E+00 1.744E+00	2.137E+00 1.881E+00 1.801E+00	1.988E+00 1.914E+00 1.800E+00	2.004E+00 1.913E+00 1.566E+00	1.998E+00 1.715E+00 1.575E+00	2.027E+00 1.726E+00 1.568E+00	2.024E+00 1.719E+00 1.587E+00	1.854E+00 1.739E+00 1.584E+00

Table VI (Continued)

I=33, J=1,33	2.296E+00	2.296E+00	2.296E+00	2.296E+00	2.291E+00	2.293E+00	2.292E+00	2.294E+00	2.294E+00	2.216E+00
	2.227E+00	2.220E+00	2.242E+00	2.240E+00	2.269E+00	2.269E+00	2.015E+00	2.028E+00	2.019E+00	2.047E+00
	2.044E+00	2.092E+00	2.090E+00	2.169E+00	2.168E+00	1.795E+00	1.809E+00	1.797E+00	1.825E+00	1.821E+00
	1.918E+00	1.512E+00	1.719E+00							
I=34, J=1,34	1.762E+00	1.761E+00	1.761E+00	1.761E+00	1.733E+00	1.739E+00	1.736E+00	1.749E+00	1.748E+00	1.624E+00
	1.633E+00	1.628E+00	1.649E+00	1.647E+00	1.687E+00	1.686E+00	1.505E+00	1.514E+00	1.508E+00	1.526E+00
	1.524E+00	1.551E+00	1.550E+00	1.587E+00	1.586E+00	1.384E+00	1.391E+00	1.385E+00	1.400E+00	1.398E+00
	1.450E+00	1.256E+00	1.344E+00	1.168E+00						
I=35, J=1,35	1.389E+00	1.389E+00	1.389E+00	1.389E+00	1.385E+00	1.386E+00	1.386E+00	1.388E+00	1.387E+00	1.344E+00
	1.349E+00	1.346E+00	1.357E+00	1.356E+00	1.372E+00	1.372E+00	1.261E+00	1.267E+00	1.263E+00	1.274E+00
	1.273E+00	1.291E+00	1.290E+00	1.323E+00	1.322E+00	1.174E+00	1.179E+00	1.175E+00	1.186E+00	1.184E+00
	1.223E+00	1.086E+00	1.150E+00	1.028E+00	9.418E-01					
I=36, J=1,36	1.125E+00	1.125E+00	1.125E+00	1.125E+00	1.122E+00	1.123E+00	1.122E+00	1.124E+00	1.124E+00	1.091E+00
	1.095E+00	1.092E+00	1.100E+00	1.100E+00	1.112E+00	1.112E+00	1.032E+00	1.036E+00	1.033E+00	1.041E+00
	1.040E+00	1.053E+00	1.053E+00	1.074E+00	1.075E+00	9.716E-01	9.751E-01	9.723E-01	9.794E-01	9.785E-01
	1.005E+00	9.104E-01	9.544E-01	8.721E-01	8.174E-01	7.428E-01				
I=37, J=1,37	9.289E-01	9.285E-01	9.284E-01	9.284E-01	9.282E-01	9.283E-01	9.282E-01	9.283E-01	9.283E-01	9.209E-01
	9.221E-01	9.214E-01	9.237E-01	9.235E-01	9.264E-01	9.263E-01	8.862E-01	8.889E-01	8.869E-01	8.926E-01
	8.919E-01	9.011E-01	9.007E-01	9.138E-01	9.137E-01	8.421E-01	8.446E-01	8.425E-01	8.475E-01	8.469E-01
	8.655E-01	7.951E-01	8.294E-01	7.657E-01	7.247E-01	6.712E-01	5.242E-01			
I=38, J=1,38	7.805E-01	7.801E-01	7.800E-01	7.800E-01	7.799E-01	7.799E-01	7.799E-01	7.800E-01	7.800E-01	7.739E-01
	7.749E-01	7.742E-01	7.762E-01	7.760E-01	7.784E-01	7.783E-01	7.471E-01	7.491E-01	7.476E-01	7.519E-01
	7.514E-01	7.584E-01	7.581E-01	7.683E-01	7.682E-01	7.139E-01	7.158E-01	7.142E-01	7.180E-01	7.175E-01
	7.315E-01	6.789E-01	7.045E-01	6.572E-01	6.272E-01	5.889E-01	5.569E-01	5.137E-01		
I=39, J=1,39	6.646E-01	6.642E-01	6.642E-01	6.642E-01	6.642E-01	6.642E-01	6.642E-01	6.642E-01	6.642E-01	6.633E-01
	6.635E-01	6.633E-01	6.637E-01	6.636E-01	6.640E-01	6.640E-01	6.528E-01	6.539E-01	6.530E-01	6.552E-01
	6.550E-01	6.581E-01	6.580E-01	6.616E-01	6.615E-01	6.283E-01	6.296E-01	6.284E-01	6.312E-01	6.308E-01
	6.416E-01	6.015E-01	6.207E-01	5.838E-01	5.601E-01	5.298E-01	5.049E-01	4.725E-01	4.440E-01	
I=40, J=1,40	5.730E-01	5.727E-01	5.727E-01	5.726E-01	5.726E-01	5.726E-01	5.726E-01	5.726E-01	5.726E-01	5.719E-01
	5.720E-01	5.719E-01	5.722E-01	5.722E-01	5.725E-01	5.725E-01	5.631E-01	5.640E-01	5.633E-01	5.652E-01
	5.649E-01	5.676E-01	5.675E-01	5.704E-01	5.704E-01	5.438E-01	5.448E-01	5.439E-01	5.460E-01	5.457E-01
	5.542E-01	5.227E-01	5.379E-01	5.090E-01	4.905E-01	4.672E-01	4.482E-01	4.240E-01	4.036E-01	3.764E-01
I=41, J=1,41	4.988E-01	4.986E-01	4.986E-01	4.986E-01	4.986E-01	4.986E-01	4.986E-01	4.986E-01	4.986E-01	4.985E-01
	4.985E-01	4.985E-01	4.986E-01	4.986E-01	4.986E-01	4.986E-01	4.963E-01	4.966E-01	4.964E-01	4.970E-01
	4.969E-01	4.976E-01	4.976E-01	4.983E-01	4.982E-01	4.850E-01	4.858E-01	4.851E-01	4.866E-01	4.864E-01
	4.920E-01	4.584E-01	4.802E-01	4.575E-01	4.424E-01	4.232E-01	4.076E-01	3.880E-01	3.716E-01	3.505E-01
	3.319E-01									

Table VI (Continued)

I=42, J=1,42	4.383E-01	4.382E-01	4.382E-01	4.382E-01	4.382E-01	4.382E-01	4.382E-01	4.382E-01	4.382E-01	4.382E-01	4.381E-01
	4.382E-01	4.382E-01	4.382E-01	4.382E-01	4.382E-01	4.382E-01	4.382E-01	4.362E-01	4.365E-01	4.363E-01	4.368E-01
	4.367E-01	4.373E-01	4.373E-01	4.379E-01	4.379E-01	4.379E-01	4.268E-01	4.274E-01	4.268E-01	4.281E-01	4.279E-01
	4.325E-01	4.136E-01	4.229E-01	4.044E-01	3.923E-01	3.768E-01	3.644E-01	3.487E-01	3.359E-01	3.196E-01	
	3.059E-01	2.876E-01									
I=43, J=1,43	3.880E-01	3.880E-01	3.881E-01	3.881E-01	3.880E-01	3.881E-01	3.881E-01	3.880E-01	3.880E-01	3.880E-01	3.880E-01
	3.880E-01	3.880E-01	3.880E-01	3.880E-01	3.880E-01	3.880E-01	3.877E-01	3.878E-01	3.877E-01	3.878E-01	3.878E-01
	3.878E-01	3.879E-01	3.879E-01	3.880E-01	3.880E-01	3.880E-01	3.843E-01	3.840E-01	3.847E-01	3.846E-01	3.846E-01
	3.865E-01	3.742E-01	3.813E-01	3.670E-01	3.569E-01	3.441E-01	3.336E-01	3.204E-01	3.097E-01	2.961E-01	
	2.848E-01	2.703E-01	2.575E-01								
I=44, J=1,44	3.458E-01	3.460E-01	3.461E-01	3.461E-01	3.461E-01	3.461E-01	3.461E-01	3.461E-01	3.461E-01	3.461E-01	3.461E-01
	3.461E-01	3.461E-01	3.461E-01	3.461E-01	3.461E-01	3.461E-01	3.458E-01	3.459E-01	3.458E-01	3.459E-01	3.459E-01
	3.459E-01	3.460E-01	3.460E-01	3.461E-01	3.461E-01	3.426E-01	3.429E-01	3.426E-01	3.431E-01	3.431E-01	3.431E-01
	3.448E-01	3.344E-01	3.403E-01	3.284E-01	3.200E-01	3.093E-01	3.007E-01	2.898E-01	2.811E-01	2.701E-01	
	2.610E-01	2.495E-01	2.397E-01	2.269E-01							
I=45, J=1,45	3.101E-01	3.104E-01	3.106E-01	3.106E-01	3.105E-01	3.106E-01	3.106E-01	3.106E-01	3.106E-01	3.106E-01	3.106E-01
	3.106E-01	3.106E-01	3.106E-01	3.106E-01	3.106E-01	3.106E-01	3.105E-01	3.106E-01	3.106E-01	3.106E-01	3.106E-01
	3.106E-01	3.106E-01	3.106E-01	3.106E-01	3.106E-01	3.097E-01	3.098E-01	3.097E-01	3.099E-01	3.098E-01	3.098E-01
	3.103E-01	3.050E-01	3.086E-01	3.001E-01	2.935E-01	2.845E-01	2.771E-01	2.678E-01	2.602E-01	2.508E-01	
	2.431E-01	2.334E-01	2.252E-01	2.148E-01	2.056E-01						
I=46, J=1,46	2.796E-01	2.802E-01	2.804E-01	2.804E-01	2.803E-01	2.804E-01	2.804E-01	2.804E-01	2.804E-01	2.804E-01	2.804E-01
	2.804E-01	2.804E-01	2.804E-01	2.804E-01	2.804E-01	2.804E-01	2.803E-01	2.804E-01	2.804E-01	2.804E-01	2.804E-01
	2.804E-01	2.804E-01	2.804E-01	2.804E-01	2.804E-01	2.796E-01	2.796E-01	2.796E-01	2.797E-01	2.797E-01	2.797E-01
	2.801E-01	2.755E-01	2.786E-01	2.713E-01	2.657E-01	2.581E-01	2.518E-01	2.440E-01	2.376E-01	2.297E-01	
	2.233E-01	2.153E-01	2.046E-01	2.002E-01	1.930E-01	1.836E-01					
I=47, J=1,47	2.535E-01	2.542E-01	2.545E-01	2.545E-01	2.544E-01	2.545E-01	2.545E-01	2.545E-01	2.545E-01	2.545E-01	2.545E-01
	2.545E-01	2.545E-01	2.545E-01	2.545E-01	2.545E-01	2.545E-01	2.545E-01	2.545E-01	2.545E-01	2.545E-01	2.545E-01
	2.545E-01	2.545E-01	2.545E-01	2.545E-01	2.545E-01	2.543E-01	2.544E-01	2.543E-01	2.544E-01	2.544E-01	2.544E-01
	2.544E-01	2.527E-01	2.540E-01	2.498E-01	2.452E-01	2.389E-01	2.336E-01	2.268E-01	2.213E-01	2.143E-01	
	2.087E-01	2.017E-01	1.960E-01	1.887E-01	1.826E-01	1.749E-01	1.681E-01				
I=48, J=1,48	2.316E-01	2.326E-01	2.330E-01	2.329E-01	2.328E-01	2.329E-01	2.329E-01	2.329E-01	2.329E-01	2.329E-01	2.329E-01
	2.329E-01	2.329E-01	2.329E-01	2.329E-01	2.329E-01	2.329E-01	2.329E-01	2.329E-01	2.329E-01	2.329E-01	2.329E-01
	2.329E-01	2.329E-01	2.329E-01	2.329E-01	2.329E-01	2.328E-01	2.328E-01	2.328E-01	2.328E-01	2.328E-01	2.328E-01
	2.329E-01	2.313E-01	2.325E-01	2.287E-01	2.247E-01	2.192E-01	2.146E-01	2.087E-01	2.040E-01	1.980E-01	
	1.932E-01	1.872E-01	1.823E-01	1.761E-01	1.711E-01	1.646E-01	1.592E-01	1.524E-01			
I=49, J=1,49	2.135E-01	2.147E-01	2.152E-01	2.151E-01	2.150E-01	2.151E-01	2.151E-01	2.151E-01	2.151E-01	2.150E-01	2.150E-01
	2.151E-01	2.151E-01	2.151E-01	2.151E-01	2.151E-01	2.151E-01	2.150E-01	2.151E-01	2.151E-01	2.151E-01	2.151E-01
	2.151E-01	2.151E-01	2.151E-01	2.151E-01	2.151E-01	2.150E-01	2.151E-01	2.151E-01	2.151E-01	2.151E-01	2.151E-01
	2.151E-01	2.146E-01	2.150E-01	2.133E-01	2.103E-01	2.058E-01	2.017E-01	1.965E-01	1.922E-01	1.869E-01	
	1.825E-01	1.771E-01	1.727E-01	1.672E-01	1.627E-01	1.570E-01	1.523E-01	1.465E-01	1.418E-01		

TABLE VII

Relativistic, hydrogenic $F_{11}^{(0)}$ for $Z = 74$

I= 1, J=1, 1	1.04ME+02											
I= 2, J=1, 2	3.630E+01	2.520E+01										
I= 3, J=1, 3	4.297E+01	2.744E+01	3.125E+01									
I= 4, J=1, 4	3.741E+01	2.613E+01	2.929E+01	2.773E+01								
I= 5, J=1, 5	1.673E+01	1.383E+01	1.434E+01	1.403E+01	1.077E+01							
I= 6, J=1, 6	1.858E+01	1.490E+01	1.564E+01	1.525E+01	1.120E+01	1.176E+01						
I= 7, J=1, 7	1.695E+01	1.412E+01	1.441E+01	1.446E+01	1.087E+01	1.136E+01	1.101E+01					
I= 8, J=1, 8	1.727E+01	1.622E+01	1.653E+01	1.543E+01	1.164E+01	1.227E+01	1.181E+01	1.325E+01				
I= 9, J=1, 9	1.671E+01	1.582E+01	1.618E+01	1.601E+01	1.153E+01	1.213E+01	1.169E+01	1.308E+01	1.292E+01			
I=10, J=1,10	9.473E+00	8.298E+00	8.501E+00	8.375E+00	7.189E+00	7.331E+00	7.223E+00	7.475E+00	7.436E+00	5.925E+00		
I=11, J=1,11	1.022E+01 6.214E+00	8.768E+00	9.063E+00	8.899E+00	7.470E+00	7.648E+00	7.521E+00	7.802E+00	7.755E+00	6.058E+00		
I=12, J=1,12	9.547E+00 6.065E+00	8.396E+00 5.933E+00	8.671E+00	8.529E+00	7.211E+00	7.375E+00	7.261E+00	7.522E+00	7.479E+00	5.926E+00		
I=13, J=1,13	9.686E+00 6.340E+00	9.186E+00 5.180E+00	9.375E+00 6.520E+00	9.284E+00	7.745E+00	7.914E+00	7.790E+00	8.178E+00	8.125E+00	6.174E+00		
I=14, J=1,14	9.446E+00 6.293E+00	9.024E+00 6.137E+00	9.149E+00 6.447E+00	9.110E+00 6.417E+00	7.649E+00	7.813E+00	7.692E+00	8.075E+00	8.024E+00	6.132E+00		
I=15, J=1,15	9.452E+00 6.667E+00	9.408E+00 6.475E+00	9.429E+00 6.842E+00	9.418E+00 6.819E+00	8.608E+00 7.568E+00	8.772E+00	8.640E+00	8.989E+00	8.956E+00	6.476E+00		
I=16, J=1,16	9.336E+00 6.642E+00	9.297E+00 6.452E+00	9.316E+00 6.854E+00	9.306E+00 6.792E+00	8.542E+00 7.530E+00	8.699E+00 7.494E+00	8.573E+00	8.906E+00	8.874E+00	6.453E+00		
I=17, J=1,17	6.064E+00 4.438E+00	5.476E+00 4.386E+00	5.577E+00 4.446E+00	5.515E+00 4.468E+00	4.939E+00 4.610E+00	5.006E+00 4.600E+00	4.955E+00 3.740E+00	5.074E+00	5.055E+00	4.384E+00		
I=18, J=1,18	6.441E+00 4.547E+00	5.714E+00 4.490E+00	5.863E+00 4.547E+00	5.781E+00 4.578E+00	5.094E+00 4.727E+00	5.178E+00 4.716E+00	5.118E+00 3.793E+00	5.249E+00 3.852E+00	5.227E+00	4.484E+00		
I=19, J=1,19	6.098E+00 4.427E+00	5.519E+00 4.374E+00	5.654E+00 4.475E+00	5.585E+00 4.457E+00	4.940E+00 4.597E+00	5.019E+00 4.587E+00	4.964E+00 3.727E+00	5.089E+00 3.781E+00	5.068E+00 3.716E+00	4.368E+00		
I=20, J=1,20	6.170E+00 4.424E+00	5.904E+00 4.565E+00	5.002E+00 4.604E+00	5.954E+00 4.673E+00	5.224E+00 4.834E+00	5.302E+00 4.822E+00	5.245E+00 3.829E+00	5.420E+00 3.891E+00	5.395E+00 3.817E+00	4.560E+00 3.940E+00		

Table VII (Continued)

I=21, J=1,21	6.047E+00	5.822E+00	5.908E+00	5.867E+00	5.169E+00	5.244E+00	5.189E+00	5.363E+00	5.339E+00	4.522E+00
	4.583E+00	4.524E+00	4.653E+00	4.633E+00	4.792E+00	4.780E+00	3.808E+00	3.869E+00	3.796E+00	3.917E+00
	3.894E+00									
I=22, J=1,22	6.050E+00	6.018E+00	6.033E+00	6.025E+00	5.580E+00	5.660E+00	5.598E+00	5.775E+00	5.758E+00	4.832E+00
	4.895E+00	4.832E+00	4.943E+00	4.943E+00	5.175E+00	5.161E+00	3.952E+00	4.021E+00	3.936E+00	4.077E+00
	4.050E+00	4.272E+00								
I=23, J=1,23	5.990E+00	5.962E+00	5.975E+00	5.968E+00	5.546E+00	5.624E+00	5.563E+00	5.734E+00	5.717E+00	4.809E+00
	4.870E+00	4.809E+00	4.937E+00	4.917E+00	5.149E+00	5.135E+00	3.942E+00	4.010E+00	3.926E+00	4.065E+00
	4.039E+00	4.258E+00	4.244E+00							
I=24, J=1,24	5.990E+00	5.989E+00	5.989E+00	5.989E+00	5.911E+00	5.932E+00	5.913E+00	5.954E+00	5.951E+00	5.289E+00
	5.366E+00	5.281E+00	5.445E+00	5.420E+00	5.674E+00	5.664E+00	4.122E+00	4.199E+00	4.101E+00	4.261E+00
	4.230E+00	4.497E+00	4.480E+00	4.926E+00						
I=25, J=1,25	5.955E+00	5.954E+00	5.954E+00	5.954E+00	5.880E+00	5.900E+00	5.882E+00	5.921E+00	5.918E+00	5.272E+00
	5.348E+00	5.264E+00	5.425E+00	5.401E+00	5.649E+00	5.640E+00	4.115E+00	4.192E+00	4.094E+00	4.253E+00
	4.222E+00	4.487E+00	4.471E+00	4.914E+00	4.903E+00					
I=26, J=1,26	4.206E+00	3.871E+00	3.928E+00	3.892E+00	3.569E+00	3.606E+00	3.578E+00	3.644E+00	3.633E+00	3.266E+00
	3.296E+00	3.268E+00	3.321E+00	3.312E+00	3.387E+00	3.382E+00	2.945E+00	2.970E+00	2.941E+00	2.988E+00
	2.978E+00	3.046E+00	3.041E+00	3.128E+00	3.124E+00	2.572E+00				
I=27, J=1,27	4.421E+00	4.010E+00	4.092E+00	4.046E+00	3.661E+00	3.708E+00	3.675E+00	3.747E+00	3.734E+00	3.331E+00
	3.364E+00	3.334E+00	3.391E+00	3.380E+00	3.459E+00	3.453E+00	2.989E+00	3.017E+00	2.986E+00	3.035E+00
	3.025E+00	3.096E+00	3.090E+00	3.180E+00	3.176E+00	2.597E+00	2.625E+00			
I=28, J=1,28	4.224E+00	3.893E+00	3.970E+00	3.930E+00	3.566E+00	3.610E+00	3.579E+00	3.649E+00	3.637E+00	3.252E+00
	3.283E+00	3.255E+00	3.309E+00	3.299E+00	3.375E+00	3.369E+00	2.927E+00	2.954E+00	2.924E+00	2.971E+00
	2.962E+00	3.028E+00	3.023E+00	3.109E+00	3.105E+00	2.560E+00	2.585E+00	2.549E+00		
I=29, J=1,29	4.266E+00	4.110E+00	4.167E+00	4.139E+00	3.731E+00	3.774E+00	3.742E+00	3.838E+00	3.824E+00	3.372E+00
	3.405E+00	3.374E+00	3.443E+00	3.432E+00	3.517E+00	3.510E+00	3.012E+00	3.040E+00	3.008E+00	3.064E+00
	3.054E+00	3.127E+00	3.121E+00	3.214E+00	3.210E+00	2.609E+00	2.637E+00	2.597E+00	2.653E+00	
I=30, J=1,30	4.195E+00	4.062E+00	4.112E+00	4.088E+00	3.697E+00	3.739E+00	3.708E+00	3.804E+00	3.791E+00	3.346E+00
	3.379E+00	3.348E+00	3.416E+00	3.405E+00	3.489E+00	3.483E+00	2.993E+00	3.020E+00	2.989E+00	3.044E+00
	3.034E+00	3.106E+00	3.100E+00	3.191E+00	3.187E+00	2.598E+00	2.625E+00	2.586E+00	2.640E+00	2.628E+00
I=31, J=1,31	4.162E+00	4.161E+00	4.161E+00	4.161E+00	4.096E+00	4.113E+00	4.099E+00	4.131E+00	4.128E+00	3.744E+00
	3.781E+00	3.742E+00	3.821E+00	3.809E+00	3.947E+00	3.941E+00	3.305E+00	3.336E+00	3.296E+00	3.360E+00
	3.348E+00	3.446E+00	3.440E+00	3.591E+00	3.586E+00	2.751E+00	2.784E+00	2.734E+00	2.802E+00	2.787E+00
	3.038E+00									
I=32, J=1,32	3.086E+00	2.876E+00	2.912E+00	2.890E+00	2.690E+00	2.713E+00	2.695E+00	2.736E+00	2.729E+00	2.506E+00
	2.523E+00	2.507E+00	2.539E+00	2.533E+00	2.579E+00	2.575E+00	2.316E+00	2.330E+00	2.313E+00	2.341E+00
	2.335E+00	2.375E+00	2.372E+00	2.422E+00	2.420E+00	2.112E+00	2.125E+00	2.107E+00	2.132E+00	2.126E+00
	2.206E+00	1.877E+00								

Table VII (Continued)

I=33, J=1,33	3.044E+00	3.044E+00	3.044E+00	3.044E+00	3.039E+00	3.040E+00	3.039E+00	3.042E+00	3.042E+00	2.948E+00
	2.961E+00	2.946E+00	2.974E+00	2.970E+00	3.009E+00	3.007E+00	2.686E+00	2.704E+00	2.680E+00	2.718E+00
	2.711E+00	2.774E+00	2.770E+00	2.875E+00	2.873E+00	2.397E+00	2.415E+00	2.387E+00	2.424E+00	2.416E+00
	2.542E+00	2.025E+00	2.279E+00							
I=34, J=1,34	2.340E+00	2.339E+00	2.339E+00	2.339E+00	2.305E+00	2.313E+00	2.306E+00	2.323E+00	2.321E+00	2.163E+00
	2.176E+00	2.162E+00	2.191E+00	2.187E+00	2.240E+00	2.238E+00	2.006E+00	2.017E+00	2.003E+00	2.026E+00
	2.022E+00	2.058E+00	2.056E+00	2.104E+00	2.104E+00	1.844E+00	1.853E+00	1.840E+00	1.859E+00	1.855E+00
	1.922E+00	1.675E+00	1.781E+00	1.549E+00						
I=35, J=1,35	1.842E+00	1.841E+00	1.841E+00	1.841E+00	1.837E+00	1.838E+00	1.837E+00	1.840E+00	1.839E+00	1.786E+00
	1.793E+00	1.785E+00	1.800E+00	1.798E+00	1.819E+00	1.819E+00	1.677E+00	1.684E+00	1.675E+00	1.690E+00
	1.687E+00	1.712E+00	1.710E+00	1.753E+00	1.752E+00	1.563E+00	1.569E+00	1.559E+00	1.573E+00	1.570E+00
	1.621E+00	1.445E+00	1.523E+00	1.362E+00	1.247E+00					
I=36, J=1,36	1.491E+00	1.491E+00	1.491E+00	1.491E+00	1.488E+00	1.489E+00	1.488E+00	1.490E+00	1.489E+00	1.449E+00
	1.454E+00	1.449E+00	1.459E+00	1.458E+00	1.474E+00	1.474E+00	1.372E+00	1.377E+00	1.371E+00	1.381E+00
	1.379E+00	1.396E+00	1.395E+00	1.426E+00	1.425E+00	1.292E+00	1.296E+00	1.289E+00	1.299E+00	1.297E+00
	1.332E+00	1.211E+00	1.244E+00	1.155E+00	1.082E+00	9.836E-01				
I=37, J=1,37	1.230E+00	1.230E+00	1.230E+00	1.230E+00	1.229E+00	1.229E+00	1.229E+00	1.230E+00	1.230E+00	1.221E+00
	1.222E+00	1.221E+00	1.224E+00	1.223E+00	1.227E+00	1.227E+00	1.177E+00	1.180E+00	1.175E+00	1.183E+00
	1.181E+00	1.194E+00	1.193E+00	1.210E+00	1.210E+00	1.118E+00	1.122E+00	1.117E+00	1.123E+00	1.122E+00
	1.146E+00	1.056E+00	1.098E+00	1.014E+00	9.593E-01	8.885E-01	8.261E-01			
I=38, J=1,38	1.033E+00	1.033E+00	1.033E+00	1.033E+00	1.033E+00	1.033E+00	1.033E+00	1.033E+00	1.033E+00	1.026E+00
	1.027E+00	1.026E+00	1.028E+00	1.028E+00	1.031E+00	1.031E+00	9.917E-01	9.944E-01	9.906E-01	9.963E-01
	9.952E-01	1.005E+00	1.004E+00	1.017E+00	1.017E+00	9.478E-01	9.503E-01	9.464E-01	9.515E-01	9.503E-01
	9.687E-01	9.014E-01	9.326E-01	8.701E-01	8.302E-01	7.795E-01	7.370E-01	6.798E-01		
I=39, J=1,39	8.794E-01	8.791E-01	8.791E-01	8.791E-01	8.791E-01	8.791E-01	8.791E-01	8.791E-01	8.791E-01	8.781E-01
	8.783E-01	8.780E-01	8.785E-01	8.784E-01	8.789E-01	8.788E-01	8.654E-01	8.668E-01	8.647E-01	8.676E-01
	8.670E-01	8.712E-01	8.710E-01	8.757E-01	8.756E-01	8.335E-01	8.352E-01	8.324E-01	8.360E-01	8.351E-01
	8.493E-01	7.982E-01	8.215E-01	7.728E-01	7.412E-01	7.011E-01	6.680E-01	6.251E-01	5.873E-01	
I=40, J=1,40	7.581E-01	7.579E-01	7.580E-01	7.579E-01	7.579E-01	7.579E-01	7.579E-01	7.579E-01	7.579E-01	7.571E-01
	7.572E-01	7.570E-01	7.574E-01	7.573E-01	7.577E-01	7.577E-01	7.465E-01	7.476E-01	7.459E-01	7.483E-01
	7.478E-01	7.513E-01	7.511E-01	7.550E-01	7.549E-01	7.212E-01	7.225E-01	7.203E-01	7.231E-01	7.224E-01
	7.336E-01	6.934E-01	7.118E-01	6.736E-01	6.490E-01	6.182E-01	5.929E-01	5.609E-01	5.339E-01	4.979E-01
I=41, J=1,41	6.596E-01	6.596E-01	6.597E-01	6.597E-01	6.597E-01	6.597E-01	6.597E-01	6.597E-01	6.597E-01	6.596E-01
	6.596E-01	6.596E-01	6.596E-01	6.596E-01	6.597E-01	6.597E-01	6.571E-01	6.574E-01	6.569E-01	6.576E-01
	6.575E-01	6.584E-01	6.543E-01	6.592E-01	6.592E-01	6.429E-01	6.439E-01	6.422E-01	6.442E-01	6.437E-01
	6.510E-01	6.215E-01	6.363E-01	6.054E-01	5.853E-01	5.598E-01	5.392E-01	5.132E-01	4.915E-01	4.636E-01
	4.390E-01									

Table VII (Continued)

I=42, J=1,42	5.795E-01	5.796E-01	5.798E-01	5.798E-01	5.797E-01	5.798E-01	5.798E-01	5.798E-01	5.798E-01	5.798E-01	5.797E-01
	5.797E-01	5.797E-01	5.797E-01	5.797E-01	5.798E-01	5.798E-01	5.798E-01	5.775E-01	5.778E-01	5.773E-01	5.779E-01
	5.778E-01	5.786E-01	5.786E-01	5.794E-01	5.793E-01	5.656E-01	5.664E-01	5.650E-01	5.667E-01	5.663E-01	5.663E-01
	5.723E-01	5.482E-01	5.594E-01	5.351E-01	5.190E-01	4.985E-01	4.820E-01	4.613E-01	4.443E-01	4.228E-01	4.228E-01
	4.045E-01	3.803E-01									
I=43, J=1,43	5.127E-01	5.131E-01	5.133E-01	5.133E-01	5.132E-01	5.133E-01	5.133E-01	5.133E-01	5.133E-01	5.133E-01	5.133E-01
	5.133E-01	5.133E-01	5.133E-01	5.133E-01	5.133E-01	5.133E-01	5.129E-01	5.130E-01	5.129E-01	5.130E-01	5.130E-01
	5.130E-01	5.131E-01	5.131E-01	5.132E-01	5.132E-01	5.084E-01	5.089E-01	5.081E-01	5.090E-01	5.088E-01	5.088E-01
	5.113E-01	4.959E-01	5.044E-01	4.855E-01	4.721E-01	4.551E-01	4.412E-01	4.237E-01	4.095E-01	3.916E-01	3.916E-01
	3.767E-01	3.575E-01	3.405E-01								
I=44, J=1,44	4.569E-01	4.576E-01	4.579E-01	4.578E-01	4.577E-01	4.578E-01	4.578E-01	4.578E-01	4.578E-01	4.578E-01	4.578E-01
	4.578E-01	4.578E-01	4.578E-01	4.578E-01	4.578E-01	4.578E-01	4.575E-01	4.575E-01	4.575E-01	4.575E-01	4.576E-01
	4.577E-01	4.577E-01	4.577E-01	4.578E-01	4.578E-01	4.536E-01	4.539E-01	4.533E-01	4.540E-01	4.538E-01	4.538E-01
	4.560E-01	4.430E-01	4.502E-01	4.344E-01	4.232E-01	4.092E-01	3.977E-01	3.833E-01	3.717E-01	3.571E-01	3.571E-01
	3.451E-01	3.299E-01	3.170E-01	3.000E-01							
I=45, J=1,45	4.095E-01	4.104E-01	4.108E-01	4.108E-01	4.106E-01	4.108E-01	4.108E-01	4.108E-01	4.108E-01	4.108E-01	4.107E-01
	4.108E-01	4.108E-01	4.108E-01	4.108E-01	4.108E-01	4.108E-01	4.107E-01	4.107E-01	4.107E-01	4.107E-01	4.107E-01
	4.107E-01	4.107E-01	4.107E-01	4.108E-01	4.108E-01	4.097E-01	4.098E-01	4.096E-01	4.099E-01	4.098E-01	4.098E-01
	4.104E-01	4.039E-01	4.082E-01	3.969E-01	3.881E-01	3.762E-01	3.664E-01	3.542E-01	3.441E-01	3.316E-01	3.316E-01
	3.214E-01	3.086E-01	2.978E-01	2.840E-01	2.718E-01						
I=46, J=1,46	3.692E-01	3.704E-01	3.709E-01	3.708E-01	3.706E-01	3.708E-01	3.708E-01	3.708E-01	3.708E-01	3.708E-01	3.707E-01
	3.708E-01	3.708E-01	3.708E-01	3.708E-01	3.708E-01	3.708E-01	3.707E-01	3.708E-01	3.707E-01	3.708E-01	3.708E-01
	3.703E-01	3.708E-01	3.708E-01	3.708E-01	3.708E-01	3.698E-01	3.699E-01	3.697E-01	3.700E-01	3.699E-01	3.699E-01
	3.705E-01	3.648E-01	3.585E-01	3.588E-01	3.513E-01	3.413E-01	3.330E-01	3.226E-01	3.142E-01	3.038E-01	3.038E-01
	2.452E-01	2.846E-01	2.758E-01	2.646E-01	2.552E-01	2.427E-01					
I=47, J=1,47	3.345E-01	3.360E-01	3.366E-01	3.365E-01	3.363E-01	3.365E-01	3.365E-01	3.365E-01	3.365E-01	3.365E-01	3.364E-01
	3.365E-01	3.365E-01	3.365E-01	3.365E-01	3.365E-01	3.365E-01	3.365E-01	3.365E-01	3.365E-01	3.365E-01	3.365E-01
	3.365E-01	3.365E-01	3.365E-01	3.365E-01	3.365E-01	3.363E-01	3.364E-01	3.363E-01	3.363E-01	3.363E-01	3.363E-01
	3.364E-01	3.344E-01	3.354E-01	3.304E-01	3.243E-01	3.159E-01	3.089E-01	2.999E-01	2.925E-01	2.834E-01	2.834E-01
	2.760E-01	2.667E-01	2.591E-01	2.495E-01	2.415E-01	2.312E-01	2.223E-01				
I=48, J=1,48	3.056E-01	3.074E-01	3.081E-01	3.080E-01	3.078E-01	3.080E-01	3.080E-01	3.080E-01	3.080E-01	3.080E-01	3.079E-01
	3.080E-01	3.080E-01	3.080E-01	3.080E-01	3.080E-01	3.080E-01	3.079E-01	3.080E-01	3.080E-01	3.080E-01	3.080E-01
	3.080E-01	3.080E-01	3.080E-01	3.080E-01	3.080E-01	3.078E-01	3.078E-01	3.078E-01	3.078E-01	3.078E-01	3.078E-01
	3.079E-01	3.061E-01	3.074E-01	3.025E-01	2.972E-01	2.899E-01	2.838E-01	2.760E-01	2.697E-01	2.618E-01	2.618E-01
	2.554E-01	2.475E-01	2.410E-01	2.329E-01	2.261E-01	2.176E-01	2.105E-01	2.015E-01			
I=49, J=1,49	2.816E-01	2.837E-01	2.845E-01	2.844E-01	2.842E-01	2.844E-01	2.844E-01	2.843E-01	2.843E-01	2.843E-01	2.843E-01
	2.844E-01	2.844E-01	2.843E-01	2.843E-01	2.843E-01	2.843E-01	2.843E-01	2.844E-01	2.844E-01	2.843E-01	2.843E-01
	2.843E-01	2.843E-01	2.843E-01	2.843E-01	2.843E-01	2.843E-01	2.843E-01	2.843E-01	2.843E-01	2.843E-01	2.843E-01
	2.843E-01	2.838E-01	2.842E-01	2.821E-01	2.780E-01	2.720E-01	2.666E-01	2.598E-01	2.541E-01	2.470E-01	2.470E-01
	2.413E-01	2.341E-01	2.283E-01	2.210E-01	2.150E-01	2.076E-01	2.013E-01	1.936E-01	1.874E-01		

TABLE VIII

Relativistic, hydrogenic $F_{ij}^{(0)}$ for $Z = 92$

I= 1, J=1, 1	1.424E+02											
I= 2, J=1, 2	5.024E+01	3.414E+01										
I= 3, J=1, 3	6.049E+01	3.746E+01	4.322E+01									
I= 4, J=1, 4	4.763E+01	3.426E+01	3.834E+01	3.510E+01								
I= 5, J=1, 5	2.269E+01	1.847E+01	1.925E+01	1.847E+01	1.424E+01							
I= 6, J=1, 6	2.547E+01	2.001E+01	2.118E+01	2.014E+01	1.485E+01	1.566E+01						
I= 7, J=1, 7	2.171E+01	1.820E+01	1.916E+01	1.833E+01	1.407E+01	1.470E+01	1.396E+01					
I= 8, J=1, 8	2.211E+01	2.085E+01	2.137E+01	2.094E+01	1.516E+01	1.599E+01	1.499E+01	1.686E+01				
I= 9, J=1, 9	2.097E+01	2.003E+01	2.044E+01	2.008E+01	1.492E+01	1.569E+01	1.474E+01	1.650E+01	1.619E+01			
I=10, J=1,10	1.264E+01	1.094E+01	1.125E+01	1.094E+01	9.420E+00	9.621E+00	9.370E+00	9.713E+00	9.628E+00	7.725E+00		
I=11, J=1,11	1.375E+01	1.161E+01	1.205E+01	1.165E+01	9.809E+00	1.006E+01	9.768E+00	1.015E+01	1.005E+01	7.908E+00		
I=12, J=1,12	1.220E+01	1.076E+01	1.115E+01	1.083E+01	9.226E+00	9.445E+00	9.197E+00	9.536E+00	9.448E+00	7.605E+00		
I=13, J=1,13	1.237E+01	1.176E+01	1.211E+01	1.181E+01	9.921E+00	1.015E+01	9.877E+00	1.038E+01	1.027E+01	7.947E+00		
I=14, J=1,14	1.189E+01	1.143E+01	1.162E+01	1.146E+01	9.724E+00	9.941E+00	9.680E+00	1.017E+01	1.007E+01	7.856E+00		
I=15, J=1,15	1.189E+01	1.185E+01	1.187E+01	1.185E+01	1.095E+01	1.114E+01	1.088E+01	1.132E+01	1.125E+01	8.329E+00		
I=16, J=1,16	1.167E+01	1.163E+01	1.165E+01	1.163E+01	1.041E+01	1.099E+01	1.074E+01	1.115E+01	1.109E+01	8.281E+00		
I=17, J=1,17	7.996E+00	7.156E+00	7.305E+00	7.154E+00	6.421E+00	6.516E+00	6.398E+00	6.558E+00	6.517E+00	5.681E+00		
I=18, J=1,18	8.548E+00	7.493E+00	7.707E+00	7.511E+00	6.634E+00	6.753E+00	6.615E+00	6.791E+00	6.744E+00	5.818E+00		
I=19, J=1,19	7.771E+00	7.045E+00	7.216E+00	7.075E+00	6.242E+00	6.397E+00	6.278E+00	6.440E+00	6.397E+00	5.560E+00		
I=20, J=1,20	7.459E+00	7.534E+00	7.661E+00	7.554E+00	6.658E+00	6.763E+00	6.638E+00	6.865E+00	6.815E+00	5.810E+00		

Table VIII (Continued)

I=21, J=1,21	7.410E+00 5.412E+00 4.861E+00	7.352E+00 5.478E+00 5.358E+00	7.954E+00 5.851E+00 5.509E+00	7.381E+00 5.811E+00 5.152E+00	6.545E+00 6.012E+00 6.445E+00	6.646E+00 5.988E+00 6.418E+00	6.525E+00 4.850E+00 5.023E+00	6.751E+00 4.925E+00 5.109E+00	6.703E+00 4.774E+00 4.932E+00	5.731E+00 4.925E+00 5.107E+00
I=22, J=1,22	7.414E+00 6.208E+00 5.078E+00	7.574E+00 6.078E+00 5.358E+00	7.596E+00 6.242E+00 5.509E+00	7.580E+00 6.202E+00 6.159E+00	7.072E+00 6.446E+00 6.415E+00	7.172E+00 6.468E+00 7.101E+00	7.042E+00 5.045E+00 7.082E+00	7.268E+00 5.133E+00 5.266E+00	7.232E+00 4.953E+00 5.366E+00	6.128E+00 5.131E+00 5.155E+00
I=23, J=1,23	7.496E+00 6.159E+00 5.055E+00	7.468E+00 6.029E+00 5.330E+00	7.482E+00 5.192E+00 5.509E+00	7.469E+00 5.152E+00 6.159E+00	7.002E+00 6.445E+00 6.113E+00	7.096E+00 6.418E+00 7.374E+00	6.973E+00 5.023E+00 7.341E+00	7.185E+00 5.109E+00 7.388E+00	7.153E+00 4.932E+00 7.381E+00	6.080E+00 5.107E+00 6.673E+00
I=24, J=1,24	7.496E+00 6.801E+00 5.296E+00	7.445E+00 6.426E+00 5.631E+00	7.445E+00 5.830E+00 5.509E+00	7.494E+00 6.782E+00 6.159E+00	7.415E+00 7.101E+00 6.113E+00	7.437E+00 7.082E+00 7.374E+00	7.402E+00 5.266E+00 7.341E+00	7.452E+00 5.366E+00 7.388E+00	7.445E+00 5.155E+00 7.381E+00	6.708E+00 5.357E+00 6.673E+00
I=25, J=1,25	7.428E+00 6.764E+00 5.281E+00	7.426E+00 6.593E+00 5.613E+00	7.427E+00 5.792E+00 5.541E+00	7.426E+00 6.744E+00 6.136E+00	7.353E+00 7.053E+00 6.113E+00	7.374E+00 7.035E+00 7.374E+00	7.341E+00 5.252E+00 7.341E+00	7.388E+00 5.351E+00 7.381E+00	7.381E+00 5.142E+00 7.381E+00	6.673E+00 5.342E+00 6.673E+00
I=26, J=1,26	5.499E+00 4.251E+00 3.801E+00	5.023E+00 4.144E+00 3.890E+00	5.107E+00 4.240E+00 3.874E+00	5.022E+00 4.240E+00 3.994E+00	4.612E+00 4.339E+00 3.987E+00	4.665E+00 4.328E+00 3.303E+00	4.599E+00 3.790E+00 3.303E+00	4.688E+00 3.824E+00 3.824E+00	4.665E+00 3.758E+00 3.824E+00	4.211E+00 3.820E+00 3.820E+00
I=27, J=1,27	5.811E+00 4.344E+00 3.451E+00	5.215E+00 4.278E+00 3.954E+00	5.335E+00 4.351E+00 3.943E+00	5.225E+00 4.329E+00 4.062E+00	4.738E+00 4.434E+00 4.054E+00	4.803E+00 4.421E+00 3.337E+00	4.727E+00 3.849E+00 3.374E+00	4.824E+00 3.886E+00 3.374E+00	4.797E+00 3.816E+00 3.374E+00	4.298E+00 3.882E+00 3.374E+00
I=28, J=1,28	5.368E+00 4.165E+00 3.724E+00	4.952E+00 4.103E+00 3.804E+00	5.051E+00 4.174E+00 3.794E+00	4.971E+00 4.154E+00 3.907E+00	4.526E+00 4.250E+00 3.900E+00	4.586E+00 4.239E+00 3.253E+00	4.519E+00 3.713E+00 3.285E+00	4.609E+00 3.746E+00 3.208E+00	4.585E+00 3.683E+00 3.208E+00	4.124E+00 3.743E+00 3.208E+00
I=29, J=1,29	5.419E+00 4.324E+00 3.841E+00	5.228E+00 4.256E+00 3.935E+00	5.302E+00 4.344E+00 3.923E+00	5.242E+00 4.322E+00 4.040E+00	4.739E+00 4.430E+00 4.032E+00	4.797E+00 4.417E+00 3.319E+00	4.728E+00 3.823E+00 3.355E+00	4.852E+00 3.860E+00 3.269E+00	4.824E+00 3.790E+00 3.340E+00	4.279E+00 3.862E+00 3.340E+00
I=30, J=1,31	5.276E+00 4.270E+00 3.800E+00	5.128E+00 4.204E+00 3.892E+00	5.189E+00 4.241E+00 3.881E+00	5.140E+00 4.269E+00 3.996E+00	4.670E+00 4.376E+00 3.988E+00	4.726E+00 4.363E+00 3.295E+00	4.659E+00 3.783E+00 3.329E+00	4.783E+00 3.819E+00 3.246E+00	4.756E+00 3.751E+00 3.315E+00	4.227E+00 3.821E+00 3.291E+00
I=31, J=1,31	5.210E+00 4.772E+00 4.167E+00 3.795E+00	5.208E+00 4.590E+00 4.711E+00 3.795E+00	5.209E+00 4.790E+00 4.249E+00 3.795E+00	5.208E+00 4.766E+00 4.489E+00 3.795E+00	5.141E+00 4.940E+00 4.480E+00 3.795E+00	5.159E+00 4.928E+00 3.496E+00 3.795E+00	5.132E+00 4.175E+00 3.539E+00 3.795E+00	5.172E+00 4.214E+00 3.431E+00 3.795E+00	5.166E+00 4.131E+00 3.517E+00 3.795E+00	4.725E+00 4.211E+00 3.487E+00 3.795E+00
I=32, J=1,32	4.008E+00 3.241E+00 2.475E+00 2.005E+00	3.713E+00 3.203E+00 3.027E+00 2.399E+00	3.755E+00 3.246E+00 3.021E+00 2.399E+00	3.712E+00 3.234E+00 3.087E+00 2.399E+00	3.460E+00 3.294E+00 3.082E+00 2.704E+00	3.492E+00 3.287E+00 2.969E+00 2.722E+00	3.452E+00 2.969E+00 2.722E+00 2.681E+00	3.506E+00 2.989E+00 2.714E+00 2.681E+00	3.492E+00 2.951E+00 2.714E+00 2.681E+00	3.217E+00 2.987E+00 2.702E+00 2.681E+00

Table VIII (Continued)

I=33, J=1.33	3.401E+00	3.401E+00	3.401E+00	3.401E+00	3.796E+00	3.797E+00	3.794E+00	3.798E+00	3.798E+00	3.698E+00
	3.713E+00	3.682E+00	3.717E+00	3.709E+00	3.757E+00	3.754E+00	3.381E+00	3.404E+00	3.353E+00	3.400E+00
	3.385E+00	3.466E+00	3.458E+00	3.589E+00	3.585E+00	3.024E+00	3.046E+00	2.988E+00	3.034E+00	3.017E+00
	3.172E+00	2.566E+00	2.841E+00							
I=34, J=1.34	2.927E+00	2.926E+00	2.927E+00	2.926E+00	2.890E+00	2.899E+00	2.885E+00	2.906E+00	2.903E+00	2.719E+00
	2.736E+00	2.707E+00	2.743E+00	2.734E+00	2.802E+00	2.797E+00	2.522E+00	2.537E+00	2.507E+00	2.536E+00
	2.528E+00	2.573E+00	2.569E+00	2.631E+00	2.628E+00	2.319E+00	2.331E+00	2.302E+00	2.326E+00	2.318E+00
	2.401E+00	2.108E+00	2.224E+00	1.934E+00						
I=35, J=1.35	2.299E+00	2.299E+00	2.299E+00	2.299E+00	2.295E+00	2.296E+00	2.294E+00	2.297E+00	2.296E+00	2.238E+00
	2.246E+00	2.231E+00	2.249E+00	2.245E+00	2.272E+00	2.270E+00	2.104E+00	2.113E+00	2.093E+00	2.112E+00
	2.106E+00	2.137E+00	2.134E+00	2.188E+00	2.186E+00	1.961E+00	1.970E+00	1.949E+00	1.966E+00	1.960E+00
	2.022E+00	1.815E+00	1.899E+00	1.699E+00	1.555E+00					
I=36, J=1.36	1.861E+00	1.861E+00	1.861E+00	1.861E+00	1.858E+00	1.859E+00	1.857E+00	1.859E+00	1.859E+00	1.815E+00
	1.821E+00	1.809E+00	1.823E+00	1.820E+00	1.840E+00	1.839E+00	1.720E+00	1.726E+00	1.712E+00	1.725E+00
	1.721E+00	1.743E+00	1.741E+00	1.779E+00	1.777E+00	1.620E+00	1.625E+00	1.611E+00	1.623E+00	1.618E+00
	1.662E+00	1.518E+00	1.577E+00	1.441E+00	1.349E+00	1.226E+00				
I=37, J=1.37	1.533E+00	1.533E+00	1.533E+00	1.533E+00	1.533E+00	1.533E+00	1.533E+00	1.533E+00	1.533E+00	1.524E+00
	1.526E+00	1.522E+00	1.526E+00	1.525E+00	1.530E+00	1.530E+00	1.473E+00	1.477E+00	1.467E+00	1.476E+00
	1.473E+00	1.489E+00	1.487E+00	1.509E+00	1.508E+00	1.400E+00	1.404E+00	1.394E+00	1.402E+00	1.399E+00
	1.429E+00	1.323E+00	1.349E+00	1.264E+00	1.195E+00	1.107E+00	1.029E+00			
I=38, J=1.38	1.288E+00	1.288E+00	1.288E+00	1.288E+00	1.288E+00	1.288E+00	1.288E+00	1.288E+00	1.288E+00	1.281E+00
	1.282E+00	1.279E+00	1.282E+00	1.281E+00	1.285E+00	1.285E+00	1.240E+00	1.244E+00	1.236E+00	1.243E+00
	1.241E+00	1.253E+00	1.252E+00	1.269E+00	1.268E+00	1.186E+00	1.189E+00	1.181E+00	1.187E+00	1.185E+00
	1.208E+00	1.128E+00	1.162E+00	1.084E+00	1.035E+00	9.712E-01	9.180E-01	8.467E-01		
I=39, J=1.39	1.095E+00	1.095E+00	1.095E+00	1.095E+00	1.095E+00	1.095E+00	1.095E+00	1.095E+00	1.095E+00	1.094E+00
	1.094E+00	1.094E+00	1.094E+00	1.094E+00	1.095E+00	1.095E+00	1.081E+00	1.082E+00	1.078E+00	1.082E+00
	1.080E+00	1.086E+00	1.085E+00	1.091E+00	1.091E+00	1.042E+00	1.044E+00	1.038E+00	1.042E+00	1.041E+00
	1.058E+00	9.981E-01	1.023E+00	9.627E-01	9.232E-01	8.732E-01	8.318E-01	7.784E-01	7.312E-01	
I=40, J=1.40	9.435E-01	9.440E-01	9.443E-01	9.442E-01	9.441E-01	9.442E-01	9.442E-01	9.442E-01	9.442E-01	9.434E-01
	9.436E-01	9.431E-01	9.436E-01	9.435E-01	9.440E-01	9.439E-01	9.319E-01	9.332E-01	9.298E-01	9.327E-01
	9.318E-01	9.361E-01	9.357E-01	9.406E-01	9.405E-01	9.011E-01	9.028E-01	8.981E-01	9.016E-01	9.002E-01
	9.140E-01	8.667E-01	8.866E-01	8.392E-01	8.084E-01	7.699E-01	7.383E-01	6.985E-01	6.647E-01	6.198E-01
I=41, J=1.41	8.205E-01	8.211E-01	8.215E-01	8.215E-01	8.214E-01	8.215E-01	8.215E-01	8.215E-01	8.215E-01	8.214E-01
	8.214E-01	8.214E-01	8.214E-01	8.214E-01	8.215E-01	8.215E-01	8.188E-01	8.192E-01	8.182E-01	8.190E-01
	8.188E-01	8.199E-01	8.198E-01	8.209E-01	8.209E-01	8.026E-01	8.039E-01	8.003E-01	8.028E-01	8.019E-01
	8.107E-01	7.762E-01	7.711E-01	7.539E-01	7.288E-01	6.971E-01	6.713E-01	6.389E-01	6.118E-01	5.770E-01

Table VIII (Continued)

I=42, J=1,42	7.205E-01	7.215E-01	7.220E-01	7.219E-01	7.218E-01	7.219E-01	7.219E-01	7.219E-01	7.219E-01	7.219E-01	7.218E-01
	7.219E-01	7.218E-01	7.219E-01	7.219E-01	7.219E-01	7.219E-01	7.219E-01	7.196E-01	7.200E-01	7.190E-01	7.198E-01
	7.195E-01	7.205E-01	7.205E-01	7.214E-01	7.214E-01	7.214E-01	7.060E-01	7.070E-01	7.041E-01	7.062E-01	7.053E-01
	6.000E-01	5.742E-01	5.530E-01	5.262E-01	5.035E-01	4.733E-01	6.371E-01	6.384E-01	6.390E-01	6.390E-01	6.390E-01
	6.388E-01	6.390E-01									
I=43, J=1,43	7.127E-01	6.845E-01	6.966E-01	6.664E-01	6.462E-01	6.206E-01	6.390E-01	6.390E-01	6.390E-01	6.390E-01	6.389E-01
	6.490E-01	6.390E-01	6.300E-01	6.389E-01	6.790E-01	6.390E-01	6.386E-01	6.387E-01	6.385E-01	6.386E-01	6.386E-01
	6.386E-01	6.388E-01	6.387E-01	6.389E-01	6.389E-01	6.338E-01	6.343E-01	6.324E-01	6.338E-01	6.334E-01	6.334E-01
	6.365E-01	6.187E-01	6.279E-01	6.045E-01	5.977E-01	5.666E-01	5.492E-01	5.274E-01	5.097E-01	4.874E-01	
	4.607E-01	4.448E-01	4.237E-01								
I=44, J=1,44	5.675E-01	5.692E-01	5.700E-01	5.699E-01	5.697E-01	5.699E-01	5.699E-01	5.699E-01	5.699E-01	5.699E-01	5.698E-01
	5.699E-01	5.699E-01	5.699E-01	5.699E-01	5.699E-01	5.699E-01	5.695E-01	5.696E-01	5.695E-01	5.696E-01	5.696E-01
	5.695E-01	5.697E-01	5.697E-01	5.698E-01	5.698E-01	5.653E-01	5.658E-01	5.645E-01	5.654E-01	5.650E-01	5.650E-01
	5.677E-01	5.526E-01	5.604E-01	5.408E-01	5.268E-01	5.093E-01	4.950E-01	4.771E-01	4.626E-01	4.444E-01	
	4.294E-01	4.106E-01	3.945E-01	3.732E-01							
I=45, J=1,45	5.084E-01	5.104E-01	5.113E-01	5.112E-01	5.109E-01	5.112E-01	5.112E-01	5.112E-01	5.112E-01	5.112E-01	5.111E-01
	5.112E-01	5.112E-01	5.112E-01	5.112E-01	5.112E-01	5.112E-01	5.111E-01	5.112E-01	5.111E-01	5.112E-01	5.112E-01
	5.111E-01	5.112E-01	5.112E-01	5.112E-01	5.112E-01	5.101E-01	5.103E-01	5.099E-01	5.101E-01	5.100E-01	5.100E-01
	5.108E-01	5.036E-01	5.080E-01	4.941E-01	4.831E-01	4.683E-01	4.560E-01	4.407E-01	4.282E-01	4.127E-01	
	3.949E-01	3.839E-01	3.705E-01	3.533E-01	3.382E-01						
I=46, J=1,46	4.581E-01	4.606E-01	4.616E-01	4.615E-01	4.612E-01	4.615E-01	4.615E-01	4.615E-01	4.614E-01	4.614E-01	4.613E-01
	4.614E-01	4.614E-01	4.614E-01	4.614E-01	4.614E-01	4.614E-01	4.613E-01	4.614E-01	4.614E-01	4.614E-01	4.614E-01
	4.614E-01	4.614E-01	4.614E-01	4.614E-01	4.614E-01	4.605E-01	4.606E-01	4.602E-01	4.605E-01	4.604E-01	4.604E-01
	4.611E-01	4.547E-01	4.586E-01	4.466E-01	4.373E-01	4.247E-01	4.144E-01	4.015E-01	3.910E-01	3.780E-01	
	3.674E-01	3.541E-01	3.431E-01	3.293E-01	3.174E-01	3.020E-01					
I=47, J=1,47	4.149E-01	4.177E-01	4.188E-01	4.187E-01	4.184E-01	4.187E-01	4.187E-01	4.187E-01	4.187E-01	4.187E-01	4.186E-01
	4.187E-01	4.187E-01	4.187E-01	4.187E-01	4.187E-01	4.187E-01	4.186E-01	4.187E-01	4.187E-01	4.187E-01	4.187E-01
	4.187E-01	4.187E-01	4.187E-01	4.187E-01	4.187E-01	4.185E-01	4.185E-01	4.185E-01	4.185E-01	4.185E-01	4.185E-01
	4.186E-01	4.165E-01	4.179E-01	4.111E-01	4.035E-01	3.932E-01	3.843E-01	3.731E-01	3.640E-01	3.526E-01	
	3.433E-01	3.318E-01	3.223E-01	3.104E-01	3.004E-01	2.876E-01	2.765E-01				
I=48, J=1,48	3.789E-01	3.821E-01	3.833E-01	3.833E-01	3.829E-01	3.832E-01	3.832E-01	3.832E-01	3.832E-01	3.832E-01	3.831E-01
	3.832E-01	3.832E-01	3.832E-01	3.832E-01	3.832E-01	3.832E-01	3.831E-01	3.832E-01	3.832E-01	3.832E-01	3.832E-01
	3.832E-01	3.832E-01	3.832E-01	3.832E-01	3.832E-01	3.830E-01	3.831E-01	3.830E-01	3.830E-01	3.830E-01	3.830E-01
	3.831E-01	3.812E-01	3.825E-01	3.764E-01	3.698E-01	3.608E-01	3.531E-01	3.434E-01	3.355E-01	3.257E-01	
	3.178E-01	3.074E-01	2.949E-01	2.897E-01	2.813E-01	2.707E-01	2.618E-01	2.506E-01			
I=49, J=1,49	3.490E-01	3.526E-01	3.539E-01	3.538E-01	3.534E-01	3.538E-01	3.538E-01	3.537E-01	3.537E-01	3.537E-01	3.536E-01
	3.538E-01	3.538E-01	3.537E-01	3.537E-01	3.537E-01	3.537E-01	3.537E-01	3.538E-01	3.538E-01	3.537E-01	3.537E-01
	3.537E-01	3.537E-01	3.537E-01	3.537E-01	3.537E-01	3.537E-01	3.537E-01	3.537E-01	3.537E-01	3.537E-01	3.537E-01
	3.537E-01	3.532E-01	3.536E-01	3.509E-01	3.459E-01	3.385E-01	3.317E-01	3.232E-01	3.162E-01	3.073E-01	
	3.002E-01	2.913E-01	2.840E-01	2.750E-01	2.675E-01	2.582E-01	2.504E-01	2.408E-01	2.331E-01		

TABLE IX

Nonrelativistic, hydrogenic $\sum_k \overline{a_{1j}^{(k)}} g_{1j}^{(k)}$

I= 1, J=1, I 0.

I= 2, J=1, I -2.195E-02 0.

I= 3, J=1, I -1.707E-02 -2.930E-02 0.

I= 4, J=1, I -1.707E-02 -2.930E-02 -1.758E-02 -1.172E-02

I= 5, J=1, I -5.769E-03 -7.476E-03 -3.141E-03 -3.141E-03 0.

I= 6, J=1, I -4.532E-03 -7.831E-03 -9.909E-03 -2.265E-03 -1.411E-02 0.

I= 7, J=1, I -4.532E-03 -7.831E-03 -2.265E-03 -6.667E-03 -1.411E-02 -7.198E-03 -4.799E-03

I= 8, J=1, I -2.472E-04 -7.304E-03 -1.246E-02 -4.649E-03 -4.557E-03 -1.139E-02 -4.232E-03 -6.056E-03

I= 9, J=1, I -2.472E-04 -7.304E-03 -3.114E-03 -8.720E-03 -4.557E-03 -3.436E-03 -8.210E-03 -4.119E-03 -5.281E-03

I=10, J=1, I -2.340E-03 -2.394E-03 -1.080E-03 -1.080E-03 -3.775E-03 -1.658E-03 -1.658E-03 -8.347E-04 -8.347E-04 0.

I=11, J=1, I -1.844E-03 -9.785E-04 -3.161E-03 -8.608E-04 -1.423E-03 -4.428E-03 -1.061E-03 -1.541E-03 -6.853E-04 -8.154E-03 0.

I=12, J=1, I -1.844E-03 -9.785E-04 -8.008E-04 -1.981E-03 -1.423E-03 -1.061E-03 -2.744E-03 -7.709E-04 -1.199E-03 -8.154E-03 -3.985E-03 -2.656E-03

I=13, J=1, I -1.319E-04 -2.111E-03 -3.998E-03 -1.348E-03 -1.636E-03 -2.091E-03 -9.365E-04 -3.335E-03 -7.641E-04 -3.084E-03 -7.330E-03 -2.626E-03 -2.877E-03

I=14, J=1, I -1.319E-04 -2.111E-03 -1.054E-03 -2.820E-03 -1.636E-03 -8.062E-04 -1.578E-03 -7.641E-04 -2.478E-03 -3.084E-03 -2.104E-03 -5.240E-03 -2.024E-03 -2.535E-03

I=15, J=1, I -2.060E-06 -5.699E-04 -6.001E-04 -2.721E-04 -3.042E-03 -4.977E-03 -2.336E-03 -6.155E-03 -1.464E-03 -1.173E-03 -2.077E-03 -1.116E-03 -4.191E-03 -1.230E-03 -3.289E-03

I=16, J=1, I -2.060E-06 -5.699E-04 -2.174E-04 -4.435E-04 -3.042E-03 -1.896E-03 -3.877E-03 -1.229E-03 -4.747E-03 -1.173E-03 -9.556E-04 -1.677E-03 -1.082E-03 -3.303E-03 -1.486E-03 -2.774E-03

I=17, J=1, I -1.178E-03 -1.099E-03 -5.069E-04 -5.089E-04 -1.326E-03 -6.256E-04 -5.256E-04 -3.416E-04 -3.416E-04 -2.275E-03 -1.013E-03 -1.013E-03 -5.512E-04 -5.512E-04 -3.126E-04 -3.126E-04 0.

I=18, J=1, I -4.289E-04 -4.626E-04 -1.446E-03 -3.812E-04 -5.288E-04 -1.575E-03 -4.162E-04 -5.936E-04 -2.857E-04 -8.833E-04 -2.516E-03 -4.279E-04 -9.817E-04 -4.251E-04 -4.528E-04 -2.661E-04 -5.285E-03 0.

I=19, J=1, I -4.289E-04 -4.626E-04 -3.812E-04 -9.137E-04 -5.288E-04 -4.162E-04 -9.955E-04 -3.165E-04 -4.704E-04 -8.833E-04 -6.279E-04 -1.572E-03 -4.808E-04 -7.590E-04 -2.942E-04 -3.926E-04 -5.285E-03 -2.537E-03 -1.691E-03

I=20, J=1, I -7.340E-05 -9.250E-04 -1.832E-03 -6.775E-04 -6.736E-04 -8.817E-04 -3.949E-04 -1.176E-03 -3.140E-04 -6.999E-04 -9.378E-04 -4.802E-04 -1.814E-03 -4.081E-04 -7.049E-04 -2.818E-04 -2.150E-03 -4.953E-03 -1.753E-03 -1.759E-03

Table IX (Continued)

I=21, J=1, I	-7.340E-05	-9.269E-04	-4.934E-04	-1.297E-03	-6.736E-04	-3.409E-04	-6.653E-04	-3.140E-04	-8.883E-04	-6.999E-04
	-4.293E-04	-7.344E-04	-4.081E-04	-1.345E-03	-3.019E-04	-5.840E-04	-2.150E-03	-1.398E-03	-3.531E-03	-1.252E-03
	-1.556E-03									
I=22, J=1, I	-1.657E-06	-3.460E-04	-3.758E-04	-1.716E-04	-6.866E-04	-1.258E-03	-6.339E-04	-2.106E-03	-5.410E-04	-1.137E-03
	-1.602E-03	-7.909E-04	-1.353E-03	-4.308E-04	-1.545E-03	-3.371E-04	-9.403E-04	-1.672E-03	-8.588E-04	-3.130E-03
	-8.601E-04	-1.716E-03								
I=23, J=1, I	-1.657E-06	-3.460E-04	-1.375E-04	-2.907E-04	-6.866E-04	-5.300E-04	-9.977E-04	-4.628E-04	-1.637E-03	-1.137E-03
	-6.557E-04	-1.264E-03	-3.843E-04	-1.083E-03	-3.371E-04	-1.243E-03	-9.403E-04	-7.233E-04	-1.333E-03	-7.466E-04
	-2.449E-03	-4.040E-04	-1.455E-03							
I=24, J=1, I	-1.106E-08	-2.228E-05	-1.910E-05	-9.757E-06	-6.186E-04	-7.758E-04	-4.244E-04	-5.833E-04	-1.986E-04	-1.301E-03
	-1.974E-03	-1.120E-03	-2.637E-03	-9.500E-04	-3.487E-03	-3.534E-04	-4.129E-04	-6.110E-04	-3.931E-04	-9.304E-04
	-4.129E-04	-1.965E-03	-2.426E-04	-1.916E-03						
I=25, J=1, I	-1.106E-08	-2.228E-05	-8.088E-06	-1.477E-05	-6.186E-04	-3.541E-04	-6.352E-04	-1.678E-04	-4.756E-04	-1.301E-03
	-9.496E-04	-1.633E-03	-8.150E-04	-2.164E-03	-2.639E-04	-2.771E-03	-4.129E-04	-3.495E-04	-5.238E-04	-3.715E-04
	-7.855E-04	-1.934E-04	-1.571E-03	-3.621E-04	-1.571E-03					
I=26, J=1, I	-6.758E-04	-6.014E-04	-2.821E-04	-2.821E-04	-6.504E-04	-3.153E-04	-3.153E-04	-1.782E-04	-1.782E-04	-8.439E-04
	-4.037E-04	-4.037E-04	-2.341E-04	-2.341E-04	-1.460E-04	-1.460E-04	-1.521E-03	-6.795E-04	-6.795E-04	-3.869E-04
	-3.869E-04	-2.302E-04	-2.302E-04	-1.437E-04	-1.437E-04	0.				
I=27, J=1, I	-5.328E-04	-2.570E-04	-7.900E-04	-2.125E-04	-2.654E-04	-7.761E-04	-2.133E-04	-3.015E-04	-1.502E-04	-3.447E-04
	-9.458E-04	-2.608E-04	-3.948E-04	-1.859E-04	-2.069E-04	-1.260E-04	-6.039E-04	-1.629E-03	-4.171E-04	-6.722E-04
	-2.888E-04	-3.395E-04	-1.897E-04	-1.912E-04	-1.250E-04	-3.695E-03	0.			
I=28, J=1, I	-5.328E-04	-2.570E-04	-2.125E-04	-5.012E-04	-2.654E-04	-2.133E-04	-4.947E-04	-1.653E-04	-2.410E-04	-3.447E-04
	-2.608E-04	-6.033E-04	-2.068E-04	-3.113E-04	-1.376E-04	-1.780E-04	-6.039E-04	-4.171E-04	-1.023E-03	-3.272E-04
	-5.189E-04	-2.111E-04	-2.800E-04	-1.361E-04	-1.691E-04	-3.695E-03	-1.758E-03	-1.172E-03		
I=29, J=1, I	-4.424E-05	-4.958E-04	-1.002E-03	-3.458E-04	-3.492E-04	-4.660E-04	-2.085E-04	-5.751E-04	-1.640E-04	-3.130E-04
	-3.989E-04	-2.099E-04	-6.546E-04	-1.799E-04	-2.970E-04	-1.316E-04	-4.102E-04	-5.878E-04	-3.110E-04	-1.135E-03
	-2.614E-04	-4.963E-04	-1.894E-04	-2.496E-04	-1.274E-04	-1.565E-03	-3.536E-03	-1.245E-03	-1.199E-03	
I=30, J=1, I	-4.424E-05	-4.958E-04	-2.130E-04	-7.101E-04	-3.492E-04	-1.799E-04	-3.515E-04	-1.640E-04	-4.381E-04	-3.130E-04
	-1.989E-04	-3.149E-04	-1.799E-04	-5.231E-04	-1.394E-04	-2.497E-04	-4.102E-04	-2.803E-04	-4.648E-04	-2.614E-04
	-8.440E-04	-2.040E-04	-4.087E-04	-1.365E-04	-2.179E-04	-1.565E-03	-9.905E-04	-2.518E-03	-8.584E-04	-1.063E-03

TABLE X

 $\tau_{1,1}$ for $Z = 1$ [illegible]

Table X (Continued)

I=21, J=1,21	7.987E-02 5.956E-02 5.031E-02	7.548E-02 5.926E-02	7.713E-02 6.122E-02	7.633E-02 6.029E-02	6.711E-02 6.340E-02	6.837E-02 6.312E-02	6.804E-02 4.735E-02	7.059E-02 4.889E-02	7.002E-02 4.675E-02	5.853E-02 5.062E-02
I=22, J=1,22	8.000E-02 6.241E-02 5.306E-02	7.911E-02 6.323E-02 5.511E-02	7.932E-02 6.434E-02	7.953E-02 6.527E-02	7.235E-02 6.719E-02	7.284E-02 6.840E-02	7.346E-02 5.026E-02	7.427E-02 5.041E-02	7.584E-02 5.123E-02	6.207E-02 5.079E-02
I=23, J=1,23	8.000E-02 6.336E-02 5.147E-02	7.911E-02 6.275E-02 5.602E-02	7.956E-02 6.532E-02 5.537E-02	7.941E-02 6.462E-02	7.235E-02 6.840E-02	7.357E-02 6.750E-02	7.310E-02 5.026E-02	7.592E-02 5.136E-02	7.474E-02 5.075E-02	6.207E-02 5.317E-02
I=24, J=1,24	8.000E-02 6.821E-02 5.602E-02	7.995E-02 6.907E-02 5.800E-02	7.997E-02 6.976E-02 5.973E-02	7.998E-02 7.144E-02 6.399E-02	7.798E-02 7.228E-02	7.816E-02 7.541E-02	7.851E-02 5.294E-02	7.891E-02 5.373E-02	7.929E-02 5.395E-02	6.781E-02 5.550E-02
I=25, J=1,25	8.000E-02 6.924E-02 5.565E-02	7.995E-02 6.856E-02 5.978E-02	7.998E-02 7.158E-02 5.840E-02	7.997E-02 7.023E-02 6.554E-02	7.798E-02 7.550E-02 6.433E-02	7.858E-02 7.299E-02	7.830E-02 5.294E-02	7.932E-02 5.399E-02	7.902E-02 5.382E-02	6.781E-02 5.606E-02
I=26, J=1,26	5.202E-02 4.170E-02 3.825E-02	4.844E-02 4.170E-02 3.924E-02	4.936E-02 4.252E-02 3.924E-02	4.936E-02 4.252E-02 4.040E-02	4.482E-02 4.353E-02 4.040E-02	4.558E-02 4.353E-02 3.308E-02	4.558E-02 3.624E-02	4.651E-02 3.738E-02	4.651E-02 3.738E-02	4.092E-02 3.825E-02
I=27, J=1,27	5.444E-02 4.197E-02 3.894E-02	5.040E-02 4.266E-02 3.976E-02	5.072E-02 4.371E-02 3.991E-02	5.130E-02 4.342E-02 4.101E-02	4.630E-02 4.438E-02 4.108E-02	4.631E-02 4.446E-02 2.969E-02	4.687E-02 3.769E-02 3.372E-02	4.765E-02 3.700E-02	4.780E-02 3.821E-02	4.219E-02 3.856E-02
I=28, J=1,28	5.444E-02 4.266E-02 3.871E-02	5.040E-02 4.232E-02 3.988E-02	5.130E-02 4.340E-02 3.981E-02	5.101E-02 4.330E-02 4.107E-02	4.630E-02 4.444E-02 4.103E-02	4.687E-02 4.440E-02 2.969E-02	4.659E-02 3.769E-02 3.196E-02	4.778E-02 3.821E-02 3.255E-02	4.771E-02 3.760E-02	4.219E-02 3.890E-02
I=29, J=1,29	5.548E-02 4.406E-02 4.017E-02	5.296E-02 4.425E-02 4.088E-02	5.316E-02 4.463E-02 4.119E-02	5.381E-02 4.515E-02 4.233E-02	4.831E-02 4.612E-02 4.245E-02	4.871E-02 4.629E-02 3.241E-02	4.897E-02 3.895E-02 3.080E-02	4.980E-02 3.913E-02 3.309E-02	5.021E-02 3.940E-02 3.386E-02	4.374E-02 3.929E-02
I=30, J=1,30	5.548E-02 4.427E-02 3.959E-02	5.296E-02 4.415E-02 4.118E-02	5.389E-02 4.515E-02 4.097E-02	5.345E-02 4.480E-02 4.244E-02	4.831E-02 4.628E-02 4.236E-02	4.900E-02 4.617E-02 3.241E-02	4.882E-02 3.895E-02 3.335E-02	5.021E-02 3.943E-02 3.182E-02	4.994E-02 3.925E-02 3.420E-02	4.374E-02 4.017E-02 3.400E-02
I=31, J=1,31	5.556E-02 4.986E-02 4.474E-02 4.067E-02	5.553E-02 4.986E-02 4.604E-02	5.554E-02 5.089E-02 4.604E-02	5.554E-02 5.089E-02 4.805E-02	5.443E-02 5.271E-02 4.805E-02	5.469E-02 5.271E-02 3.589E-02	5.469E-02 4.347E-02 3.633E-02	5.513E-02 4.390E-02 3.633E-02	5.513E-02 4.390E-02 3.723E-02	4.938E-02 4.474E-02 3.723E-02
I=32, J=1,32	3.902E-02 3.244E-02 3.037E-02 2.817E-02	3.673E-02 3.244E-02 3.086E-02 2.430E-02	3.710E-02 3.284E-02 3.086E-02	3.710E-02 3.284E-02 3.149E-02	3.451E-02 3.340E-02 3.149E-02	3.477E-02 3.340E-02 2.728E-02	3.477E-02 2.985E-02 2.744E-02	3.526E-02 3.003E-02 2.744E-02	3.526E-02 3.003E-02 2.775E-02	3.224E-02 3.037E-02 2.775E-02

I=33, J=1,33	4.082E-02	4.082E-02	4.082E-02	4.082E-02	4.071E-02	4.074E-02	4.074E-02	4.079E-02	4.079E-02	3.922E-02
	3.943E-02	3.943E-02	3.942E-02	3.982E-02	4.034E-02	4.034E-02	3.560E-02	3.583E-02	3.583E-02	3.633E-02
	3.633E-02	3.717E-02	3.717E-02	3.856E-02	3.856E-02	3.163E-02	3.187E-02	3.187E-02	3.236E-02	3.236E-02
	3.410E-02	2.656E-02	3.060E-02							
I=34, J=1,34	3.126E-02	3.124E-02	3.124E-02	3.124E-02	3.067E-02	3.080E-02	3.080E-02	3.102E-02	3.102E-02	2.870E-02
	2.887E-02	2.887E-02	2.924E-02	2.924E-02	2.995E-02	2.995E-02	2.660E-02	2.675E-02	2.675E-02	2.706E-02
	2.706E-02	2.754E-02	2.754E-02	2.819E-02	2.819E-02	2.445E-02	2.457E-02	2.457E-02	2.483E-02	2.483E-02
	2.576E-02	2.218E-02	2.390E-02	2.077E-02						
I=35, J=1,35	2.470E-02	2.469E-02	2.469E-02	2.469E-02	2.462E-02	2.464E-02	2.464E-02	2.467E-02	2.467E-02	2.381E-02
	2.391E-02	2.391E-02	2.411E-02	2.411E-02	2.440E-02	2.440E-02	2.234E-02	2.243E-02	2.243E-02	2.263E-02
	2.263E-02	2.295E-02	2.295E-02	2.353E-02	2.353E-02	2.079E-02	2.088E-02	2.088E-02	2.106E-02	2.106E-02
	2.176E-02	1.921E-02	2.046E-02	1.829E-02	1.677E-02					
I=36, J=1,36	2.001E-02	2.000E-02	2.000E-02	2.000E-02	1.994E-02	1.996E-02	1.996E-02	1.998E-02	1.998E-02	1.934E-02
	1.941E-02	1.941E-02	1.956E-02	1.956E-02	1.977E-02	1.977E-02	1.830E-02	1.837E-02	1.837E-02	1.850E-02
	1.850E-02	1.873E-02	1.873E-02	1.913E-02	1.913E-02	1.722E-02	1.728E-02	1.728E-02	1.740E-02	1.740E-02
	1.789E-02	1.613E-02	1.599E-02	1.552E-02	1.455E-02	1.323E-02				
I=37, J=1,37	1.654E-02	1.653E-02	1.553E-02	1.653E-02	1.652E-02	1.553E-02	1.653E-02	1.653E-02	1.653E-02	1.637E-02
	1.640E-02	1.640E-02	1.544E-02	1.644E-02	1.649E-02	1.649E-02	1.573E-02	1.578E-02	1.578E-02	1.588E-02
	1.588E-02	1.604E-02	1.504E-02	1.627E-02	1.627E-02	1.494E-02	1.499E-02	1.499E-02	1.508E-02	1.508E-02
	1.541E-02	1.411E-02	1.477E-02	1.364E-02	1.291E-02	1.196E-02	1.112E-02			
I=38, J=1,38	1.390E-02	1.389E-02	1.389E-02	1.389E-02	1.388E-02	1.389E-02	1.389E-02	1.389E-02	1.389E-02	1.376E-02
	1.378E-02	1.378E-02	1.382E-02	1.382E-02	1.386E-02	1.386E-02	1.327E-02	1.330E-02	1.330E-02	1.338E-02
	1.338E-02	1.350E-02	1.350E-02	1.368E-02	1.368E-02	1.267E-02	1.271E-02	1.271E-02	1.277E-02	1.277E-02
	1.303E-02	1.205E-02	1.255E-02	1.171E-02	1.117E-02	1.049E-02	9.925E-03	9.156E-03		
I=39, J=1,39	1.184E-02	1.183E-02	1.183E-02	1.183E-02	1.183E-02	1.183E-02	1.183E-02	1.183E-02	1.183E-02	1.182E-02
	1.182E-02	1.182E-02	1.182E-02	1.182E-02	1.183E-02	1.183E-02	1.161E-02	1.163E-02	1.163E-02	1.167E-02
	1.167E-02	1.172E-02	1.172E-02	1.179E-02	1.179E-02	1.16E-02	1.119E-02	1.119E-02	1.124E-02	1.124E-02
	1.143E-02	1.068E-02	1.106E-02	1.040E-02	9.982E-03	9.443E-03	9.000E-03	8.423E-03	7.916E-03	
I=40, J=1,40	1.021E-02	1.021E-02	1.020E-02	1.020E-02	1.020E-02	1.020E-02	1.020E-02	1.020E-02	1.020E-02	1.019E-02
	1.019E-02	1.019E-02	1.020E-02	1.020E-02	1.020E-02	1.020E-02	1.001E-02	1.003E-02	1.003E-02	1.006E-02
	1.006E-02	1.011E-02	1.011E-02	1.016E-02	1.016E-02	9.666E-03	9.684E-03	9.684E-03	9.722E-03	9.722E-03
	9.875E-03	9.288E-03	9.545E-03	9.070E-03	8.742E-03	8.327E-03	7.990E-03	7.559E-03	7.197E-03	6.712E-03
I=41, J=1,41	8.897E-03	8.890E-03	8.889E-03	8.889E-03	8.889E-03	8.889E-03	8.889E-03	8.889E-03	8.889E-03	8.887E-03
	8.887E-03	8.887E-03	8.888E-03	8.888E-03	8.889E-03	8.889E-03	8.841E-03	8.847E-03	8.847E-03	8.857E-03
	8.857E-03	8.871E-03	8.871E-03	8.882E-03	8.882E-03	8.627E-03	8.641E-03	8.641E-03	8.669E-03	8.669E-03
	8.769E-03	8.837E-03	8.850E-03	8.155E-03	7.888E-03	7.545E-03	7.269E-03	6.918E-03	6.628E-03	6.251E-03
	5.920E-03									

Table X (Continued)

I=42, J=1,42	7.419E-03	7.413E-03	7.413E-03	7.413E-03	7.413E-03	7.413E-03	7.413E-03	7.413E-03	7.413E-03	7.413E-03	7.411E-03
	7.811E-03	7.811E-03	7.812E-03	7.812E-03	7.812E-03	7.812E-03	7.771E-03	7.774E-03	7.776E-03	7.785E-03	
	7.785E-03	7.796E-03	7.796E-03	7.807E-03	7.807E-03	7.807E-03	7.593E-03	7.604E-03	7.604E-03	7.627E-03	7.627E-03
	7.710E-03	7.357E-03	7.539E-03	7.210E-03	6.994E-03	6.718E-03	6.497E-03	6.219E-03	5.991E-03	5.701E-03	
	5.456E-03	5.130E-03									
I=43, J=1,43	6.925E-03	6.921E-03	6.920E-03	6.920E-03	6.920E-03	6.920E-03	6.920E-03	6.920E-03	6.920E-03	6.920E-03	6.920E-03
	6.920E-03	6.920E-03	6.920E-03	6.920E-03	6.920E-03	6.920E-03	6.913E-03	6.914E-03	6.914E-03	6.916E-03	
	6.916E-03	6.918E-03	6.918E-03	6.920E-03	6.920E-03	6.838E-03	6.845E-03	6.845E-03	6.857E-03	6.857E-03	
	6.893E-03	6.660E-03	6.800E-03	6.545E-03	6.365E-03	6.136E-03	5.950E-03	5.714E-03	5.524E-03	5.282E-03	
	5.081E-03	4.822E-03	4.544E-03								
I=44, J=1,44	6.175E-03	6.173E-03	6.173E-03	6.173E-03	6.173E-03	6.173E-03	6.173E-03	6.173E-03	6.173E-03	6.173E-03	6.173E-03
	6.173E-03	6.173E-03	6.173E-03	6.173E-03	6.173E-03	6.173E-03	6.166E-03	6.167E-03	6.167E-03	6.169E-03	
	6.169E-03	6.171E-03	6.171E-03	6.172E-03	6.172E-03	6.101E-03	6.107E-03	6.107E-03	6.117E-03	6.117E-03	
	6.149E-03	5.952E-03	6.069E-03	5.855E-03	5.706E-03	5.517E-03	5.363E-03	5.169E-03	5.014E-03	4.818E-03	
	4.656E-03	4.451E-03	4.278E-03	4.048E-03							
I=45, J=1,45	5.539E-03	5.540E-03	5.541E-03	5.541E-03	5.540E-03	5.541E-03	5.541E-03	5.540E-03	5.540E-03	5.540E-03	5.540E-03
	5.540E-03	5.540E-03	5.540E-03	5.540E-03	5.540E-03	5.540E-03	5.539E-03	5.540E-03	5.540E-03	5.540E-03	
	5.540E-03	5.540E-03	5.540E-03	5.540E-03	5.540E-03	5.521E-03	5.523E-03	5.523E-03	5.527E-03	5.527E-03	
	5.535E-03	5.432E-03	5.505E-03	5.353E-03	5.235E-03	5.074E-03	4.943E-03	4.777E-03	4.643E-03	4.474E-03	
	4.337E-03	4.164E-03	4.019E-03	3.833E-03	3.669E-03						
I=46, J=1,46	4.997E-03	5.000E-03	5.002E-03	5.002E-03	5.001E-03	5.002E-03	5.002E-03	5.001E-03	5.001E-03	5.001E-03	5.001E-03
	5.002E-03	5.002E-03	5.001E-03	5.001E-03	5.001E-03	5.001E-03	5.001E-03	5.001E-03	5.001E-03	5.001E-03	
	5.001E-03	5.001E-03	5.001E-03	5.001E-03	5.001E-03	4.984E-03	4.986E-03	4.986E-03	4.989E-03	4.989E-03	
	4.997E-03	4.907E-03	4.970E-03	4.839E-03	4.739E-03	4.603E-03	4.492E-03	4.352E-03	4.240E-03	4.099E-03	
	3.984E-03	3.841E-03	3.722E-03	3.572E-03	3.444E-03	3.276E-03					
I=47, J=1,47	4.531E-03	4.534E-03	4.541E-03	4.541E-03	4.540E-03	4.541E-03	4.541E-03	4.540E-03	4.540E-03	4.540E-03	4.540E-03
	4.540E-03	4.540E-03	4.540E-03	4.540E-03	4.540E-03	4.540E-03	4.540E-03	4.540E-03	4.540E-03	4.540E-03	
	4.540E-03	4.540E-03	4.540E-03	4.540E-03	4.540E-03	4.537E-03	4.537E-03	4.537E-03	4.538E-03	4.538E-03	
	4.540E-03	4.504E-03	4.532E-03	4.456E-03	4.375E-03	4.262E-03	4.168E-03	4.046E-03	3.948E-03	3.825E-03	
	3.725E-03	3.594E-03	3.497E-03	3.368E-03	3.259E-03	3.121E-03	3.001E-03				
I=48, J=1,48	4.142E-03	4.153E-03	4.156E-03	4.156E-03	4.155E-03	4.156E-03	4.156E-03	4.156E-03	4.156E-03	4.156E-03	4.155E-03
	4.156E-03	4.156E-03	4.156E-03	4.156E-03	4.156E-03	4.156E-03	4.156E-03	4.156E-03	4.156E-03	4.156E-03	
	4.156E-03	4.156E-03	4.156E-03	4.156E-03	4.156E-03	4.153E-03	4.153E-03	4.153E-03	4.154E-03	4.154E-03	
	4.155E-03	4.123E-03	4.148E-03	4.080E-03	4.009E-03	3.912E-03	3.829E-03	3.724E-03	3.639E-03	3.533E-03	
	3.447E-03	3.340E-03	3.253E-03	3.143E-03	3.053E-03	2.938E-03	2.842E-03	2.720E-03			
I=49, J=1,49	3.820E-03	3.834E-03	3.839E-03	3.839E-03	3.837E-03	3.838E-03	3.838E-03	3.838E-03	3.838E-03	3.838E-03	3.838E-03
	3.838E-03	3.838E-03	3.838E-03	3.838E-03	3.838E-03	3.838E-03	3.838E-03	3.838E-03	3.838E-03	3.838E-03	
	3.838E-03	3.838E-03	3.838E-03	3.838E-03	3.838E-03	3.838E-03	3.838E-03	3.838E-03	3.838E-03	3.838E-03	
	3.838E-03	3.829E-03	3.837E-03	3.807E-03	3.752E-03	3.671E-03	3.599E-03	3.506E-03	3.430E-03	3.335E-03	
	3.257E-03	3.161E-03	3.042E-03	2.984E-03	2.904E-03	2.802E-03	2.718E-03	2.614E-03	2.531E-03		

TABLE XI

 τ_{-1} for $Z = 30$

I= 1, J=1, 1	3.818E+01											
I= 2, J=1, 2	1.223E+01	9.189E+00										
I= 3, J=1, 3	1.444E+01	9.040E+00	1.114E+01									
I= 4, J=1, 4	1.415E+01	8.976E+00	1.052E+01	1.060E+01								
I= 5, J=1, 5	5.910E+00	4.902E+00	5.197E+00	5.182E+00	4.039E+00							
I= 6, J=1, 6	5.533E+00	5.406E+00	5.439E+00	5.648E+00	3.763E+00	4.377E+00						
I= 7, J=1, 7	6.447E+00	5.364E+00	5.624E+00	5.489E+00	3.746E+00	4.140E+00	4.192E+00					
I= 8, J=1, 8	6.707E+00	5.050E+00	6.062E+00	6.383E+00	4.300E+00	4.327E+00	4.516E+00	5.014E+00				
I= 9, J=1, 9	6.672E+00	5.027E+00	6.315E+00	6.136E+00	4.294E+00	4.558E+00	4.389E+00	5.062E+00	5.016E+00			
I=10, J=1,10	3.442E+00	3.050E+00	3.155E+00	3.149E+00	2.613E+00	2.725E+00	2.720E+00	2.834E+00	2.832E+00	2.260E+00		
I=11, J=1,11	3.700E+00 2.363E+00	3.255E+00	3.285E+00	3.348E+00	2.782E+00	2.753E+00	2.847E+00	2.933E+00	2.956E+00	2.063E+00		
I=12, J=1,12	3.664E+00 2.235E+00	3.235E+00 2.267E+00	3.335E+00	3.292E+00	2.768E+00	2.839E+00	2.782E+00	2.940E+00	2.925E+00	2.056E+00		
I=13, J=1,13	3.771E+00 2.232E+00	3.509E+00 2.364E+00	3.524E+00 2.487E+00	3.598E+00	2.966E+00	3.013E+00	3.041E+00	3.116E+00	3.190E+00	2.296E+00		
I=14, J=1,14	3.756E+00 2.386E+00	3.499E+00 2.283E+00	3.601E+00 2.509E+00	3.543E+00 2.491E+00	2.960E+00	3.045E+00	3.015E+00	3.187E+00	3.132E+00	2.293E+00		
I=15, J=1,15	3.763E+00 2.519E+00	3.724E+00 2.537E+00	3.733E+00 2.605E+00	3.742E+00 2.669E+00	3.287E+00 2.924E+00	3.298E+00	3.369E+00	3.392E+00	3.531E+00	2.474E+00		
I=16, J=1,16	3.756E+00 2.552E+00	3.717E+00 2.519E+00	3.737E+00 2.696E+00	3.729E+00 2.624E+00	3.283E+00 2.975E+00	3.386E+00 2.934E+00	3.318E+00	3.535E+00	3.427E+00	2.472E+00		
I=17, J=1,17	2.246E+00 1.674E+00	2.051E+00 1.671E+00	2.101E+00 1.721E+00	2.058E+00 1.720E+00	1.851E+00 1.780E+00	1.895E+00 1.779E+00	1.892E+00 1.442E+00	1.944E+00	1.943E+00	1.616E+00		
I=18, J=1,18	2.376E+00 1.668E+00	2.155E+00 1.721E+00	2.172E+00 1.750E+00	2.200E+00 1.765E+00	1.930E+00 1.820E+00	1.928E+00 1.825E+00	1.959E+00 1.303E+00	2.001E+00 1.483E+00	2.009E+00	1.695E+00		
I=19, J=1,19	2.358E+00 1.718E+00	2.144E+00 1.686E+00	2.193E+00 1.758E+00	2.173E+00 1.749E+00	1.922E+00 1.817E+00	1.954E+00 1.814E+00	1.933E+00 1.300E+00	2.001E+00 1.404E+00	1.995E+00 1.425E+00	1.688E+00		
I=20, J=1,20	2.412E+00 1.783E+00	2.280E+00 1.793E+00	2.290E+00 1.803E+00	2.323E+00 1.844E+00	2.026E+00 1.898E+00	2.048E+00 1.910E+00	2.060E+00 1.431E+00	2.103E+00 1.370E+00	2.127E+00 1.462E+00	1.767E+00 1.510E+00		

Table XI (Continued)

I=21, J=1,21	2.405E+00 1.796E+00 1.513E+00	2.275E+00 1.783E+00	2.374E+00 1.843E+00	2.298E+00 1.813E+00	2.023E+00 1.907E+00	2.061E+00 1.898E+00	2.048E+00 1.429E+00	2.125E+00 1.476E+00	2.107E+00 1.407E+00	1.764E+00 1.524E+00
I=22, J=1,22	2.408E+00 1.882E+00 1.596E+00	2.382E+00 1.903E+00 1.658E+00	2.388E+00 1.937E+00	2.394E+00 1.963E+00	2.182E+00 2.022E+00	2.196E+00 2.057E+00	2.211E+00 1.518E+00	2.236E+00 1.523E+00	2.282E+00 1.542E+00	1.872E+00 1.529E+00
I=23, J=1,23	2.405E+00 1.909E+00 1.547E+00	2.379E+00 1.887E+00 1.684E+00	2.392E+00 1.964E+00 1.664E+00	2.387E+00 1.942E+00	2.180E+00 2.056E+00	2.216E+00 2.028E+00	2.198E+00 1.517E+00	2.283E+00 1.550E+00	2.247E+00 1.527E+00	1.870E+00 1.600E+00
I=24, J=1,24	2.405E+00 2.057E+00 1.684E+00	2.403E+00 2.078E+00 1.744E+00	2.404E+00 2.098E+00 1.795E+00	2.404E+00 2.147E+00 1.923E+00	2.346E+00 2.173E+00	2.351E+00 2.266E+00	2.360E+00 1.599E+00	2.372E+00 1.623E+00	2.383E+00 1.624E+00	2.045E+00 1.671E+00
I=25, J=1,25	2.402E+00 2.087E+00 1.673E+00	2.401E+00 2.061E+00 1.797E+00	2.402E+00 2.152E+00 1.754E+00	2.402E+00 2.110E+00 1.969E+00	2.344E+00 2.268E+00 1.932E+00	2.361E+00 2.192E+00	2.352E+00 1.598E+00	2.382E+00 1.630E+00	2.373E+00 1.619E+00	2.044E+00 1.687E+00
I=26, J=1,26	1.579E+00 1.262E+00 1.155E+00	1.467E+00 1.260E+00 1.185E+00	1.496E+00 1.285E+00 1.184E+00	1.494E+00 1.284E+00 1.220E+00	1.357E+00 1.315E+00 1.219E+00	1.380E+00 1.315E+00 9.998E-01	1.378E+00 1.096E+00	1.407E+00 1.131E+00	1.406E+00 1.129E+00	1.238E+00 1.155E+00
I=27, J=1,27	1.654E+00 1.270E+00 1.176E+00	1.527E+00 1.289E+00 1.201E+00	1.538E+00 1.306E+00 1.205E+00	1.553E+00 1.312E+00 1.238E+00	1.402E+00 1.341E+00 1.240E+00	1.402E+00 1.343E+00 8.984E-01	1.418E+00 1.140E+00 1.019E+00	1.441E+00 1.119E+00	1.445E+00 1.154E+00	1.276E+00 1.165E+00
I=28, J=1,28	1.643E+00 1.266E+00 1.165E+00	1.521E+00 1.275E+00 1.200E+00	1.549E+00 1.307E+00 1.198E+00	1.538E+00 1.304E+00 1.236E+00	1.396E+00 1.338E+00 1.235E+00	1.414E+00 1.337E+00 8.963E-01	1.404E+00 1.137E+00 9.645E-01	1.440E+00 1.152E+00 9.798E-01	1.437E+00 1.132E+00	1.272E+00 1.171E+00
I=29, J=1,29	1.674E+00 1.329E+00 1.209E+00	1.598E+00 1.333E+00 1.231E+00	1.605E+00 1.345E+00 1.240E+00	1.623E+00 1.359E+00 1.274E+00	1.457E+00 1.389E+00 1.277E+00	1.470E+00 1.394E+00 9.782E-01	1.476E+00 1.175E+00 9.300E-01	1.501E+00 1.180E+00 9.964E-01	1.513E+00 1.187E+00 1.020E+00	1.319E+00 1.184E+00
I=30, J=1,30	1.670E+00 1.334E+00 1.190E+00	1.596E+00 1.328E+00 1.238E+00	1.623E+00 1.358E+00 1.232E+00	1.609E+00 1.347E+00 1.276E+00	1.455E+00 1.392E+00 1.273E+00	1.476E+00 1.388E+00 9.776E-01	1.469E+00 1.174E+00 1.006E+00	1.511E+00 1.188E+00 9.576E-01	1.502E+00 1.181E+00 1.029E+00	1.318E+00 1.208E+00 1.022E+00
I=31, J=1,31	1.670E+00 1.501E+00 1.345E+00 1.222E+00	1.669E+00 1.499E+00 1.384E+00	1.670E+00 1.531E+00 1.383E+00	1.670E+00 1.530E+00 1.444E+00	1.637E+00 1.584E+00 1.444E+00	1.645E+00 1.584E+00 1.083E+00	1.644E+00 1.310E+00 1.096E+00	1.657E+00 1.322E+00 1.093E+00	1.657E+00 1.320E+00 1.120E+00	1.487E+00 1.346E+00 1.119E+00
I=32, J=1,32	1.182E+00 9.806E-01 9.164E-01 8.683E-01	1.111E+00 9.797E-01 9.313E-01 7.336E-01	1.123E+00 9.917E-01 9.311E-01	1.122E+00 9.913E-01 9.503E-01	1.043E+00 1.008E+00 9.502E-01	1.051E+00 1.008E+00 8.241E-01	1.050E+00 9.020E-01 8.290E-01	1.065E+00 9.074E-01 8.279E-01	1.065E+00 9.065E-01 8.374E-01	9.743E-01 9.168E-01 8.370E-01

Table XI (Continued)

I=33, J=1,33	1.226E+00	1.226E+00	1.226E+00	1.226E+00	1.223E+00	1.224E+00	1.224E+00	1.225E+00	1.225E+00	1.180E+00
	1.186E+00	1.185E+00	1.196E+00	1.196E+00	1.212E+00	1.212E+00	1.071E+00	1.078E+00	1.077E+00	1.092E+00
	1.091E+00	1.117E+00	1.117E+00	1.158E+00	1.158E+00	9.524E-01	9.597E-01	9.580E-01	9.728E-01	9.723E-01
	1.024E+00	8.004E-01	9.188E-01							
I=34, J=1,34	9.395E-01	9.389E-01	9.391E-01	9.390E-01	9.224E-01	9.261E-01	9.256E-01	9.323E-01	9.322E-01	8.635E-01
	8.686E-01	8.678E-01	8.791E-01	8.788E-01	9.000E-01	8.998E-01	8.004E-01	8.049E-01	8.041E-01	8.134E-01
	8.131E-01	8.275E-01	8.273E-01	8.471E-01	8.469E-01	7.356E-01	7.394E-01	7.386E-01	7.463E-01	7.460E-01
	7.738E-01	6.675E-01	7.177E-01	6.240E-01						
I=35, J=1,35	7.419E-01	7.417E-01	7.417E-01	7.417E-01	7.396E-01	7.401E-01	7.401E-01	7.410E-01	7.410E-01	7.159E-01
	7.189E-01	7.184E-01	7.244E-01	7.242E-01	7.329E-01	7.328E-01	6.718E-01	6.745E-01	6.740E-01	6.798E-01
	6.796E-01	6.895E-01	6.894E-01	7.066E-01	7.065E-01	6.253E-01	6.279E-01	6.273E-01	6.328E-01	6.326E-01
	6.534E-01	5.778E-01	6.144E-01	5.492E-01	5.035E-01					
I=36, J=1,36	6.010E-01	6.007E-01	6.007E-01	6.007E-01	5.991E-01	5.995E-01	5.995E-01	6.002E-01	6.002E-01	5.813E-01
	5.835E-01	5.831E-01	5.875E-01	5.874E-01	5.939E-01	5.939E-01	5.502E-01	5.522E-01	5.518E-01	5.559E-01
	5.557E-01	5.626E-01	5.625E-01	5.747E-01	5.746E-01	5.176E-01	5.195E-01	5.191E-01	5.228E-01	5.227E-01
	5.373E-01	4.850E-01	5.101E-01	4.661E-01	4.370E-01	3.972E-01				
I=37, J=1,37	4.966E-01	4.963E-01	4.963E-01	4.963E-01	4.962E-01	4.962E-01	4.962E-01	4.963E-01	4.962E-01	4.918E-01
	4.925E-01	4.924E-01	4.937E-01	4.937E-01	4.952E-01	4.952E-01	4.727E-01	4.741E-01	4.738E-01	4.768E-01
	4.767E-01	4.816E-01	4.815E-01	4.885E-01	4.885E-01	4.491E-01	4.504E-01	4.501E-01	4.527E-01	4.527E-01
	4.627E-01	4.239E-01	4.435E-01	4.094E-01	3.876E-01	3.590E-01	3.339E-01			
I=38, J=1,38	4.173E-01	4.170E-01	4.170E-01	4.170E-01	4.169E-01	4.169E-01	4.169E-01	4.170E-01	4.170E-01	4.133E-01
	4.139E-01	4.138E-01	4.149E-01	4.149E-01	4.161E-01	4.161E-01	3.986E-01	3.997E-01	3.994E-01	4.017E-01
	4.016E-01	4.054E-01	4.053E-01	4.108E-01	4.107E-01	3.808E-01	3.818E-01	3.816E-01	3.836E-01	3.836E-01
	3.911E-01	3.622E-01	3.767E-01	3.514E-01	3.355E-01	3.150E-01	2.979E-01	2.748E-01		
I=39, J=1,39	3.555E-01	3.553E-01	3.552E-01	3.552E-01	3.553E-01	3.552E-01	3.552E-01	3.552E-01	3.552E-01	3.547E-01
	3.548E-01	3.548E-01	3.550E-01	3.550E-01	3.552E-01	3.552E-01	3.486E-01	3.492E-01	3.491E-01	3.503E-01
	3.503E-01	3.520E-01	3.520E-01	3.539E-01	3.538E-01	3.354E-01	3.361E-01	3.359E-01	3.374E-01	3.373E-01
	3.432E-01	3.210E-01	3.321E-01	3.123E-01	2.996E-01	2.835E-01	2.701E-01	2.528E-01	2.376E-01	
I=40, J=1,40	3.066E-01	3.063E-01	3.063E-01	3.063E-01	3.063E-01	3.063E-01	3.063E-01	3.063E-01	3.063E-01	3.058E-01
	3.059E-01	3.059E-01	3.041E-01	3.061E-01	3.062E-01	3.062E-01	3.008E-01	3.013E-01	3.012E-01	3.022E-01
	3.021E-01	3.036E-01	3.035E-01	3.051E-01	3.051E-01	2.904E-01	2.909E-01	2.908E-01	2.919E-01	2.919E-01
	2.965E-01	2.790E-01	2.877E-01	2.723E-01	2.624E-01	2.499E-01	2.398E-01	2.269E-01	2.160E-01	2.014E-01
I=41, J=1,41	2.670E-01	2.668E-01	2.668E-01	2.668E-01	2.668E-01	2.668E-01	2.668E-01	2.668E-01	2.668E-01	2.667E-01
	2.668E-01	2.668E-01	2.668E-01	2.668E-01	2.668E-01	2.668E-01	2.654E-01	2.656E-01	2.655E-01	2.659E-01
	2.659E-01	2.662E-01	2.662E-01	2.666E-01	2.666E-01	2.591E-01	2.595E-01	2.594E-01	2.602E-01	2.602E-01
	2.632E-01	2.504E-01	2.569E-01	2.448E-01	2.367E-01	2.264E-01	2.182E-01	2.076E-01	1.989E-01	1.876E-01
	1.777E-01									

Table XI (Continued)

I=42, J=1,42	2.347E-01	2.345E-01	2.345E-01	2.345E-01	2.345E-01	2.345E-01	2.345E-01	2.345E-01	2.345E-01	2.345E-01	2.344E-01
	2.344E-01	2.344E-01	2.345E-01	2.345E-01	2.345E-01	2.345E-01	2.345E-01	2.333E-01	2.334E-01	2.334E-01	2.337E-01
	2.337E-01	2.340E-01	2.340E-01	2.343E-01	2.343E-01	2.343E-01	2.280E-01	2.283E-01	2.283E-01	2.290E-01	2.289E-01
	2.314E-01	2.209E-01	2.263E-01	2.164E-01	2.099E-01	2.016E-01	1.950E-01	1.866E-01	1.798E-01	1.711E-01	
	1.637E-01	1.539E-01									
I=43, J=1,43	2.078E-01	2.077E-01	2.077E-01	2.077E-01	2.077E-01	2.077E-01	2.077E-01	2.077E-01	2.077E-01	2.077E-01	2.077E-01
	2.077E-01	2.077E-01	2.077E-01	2.077E-01	2.077E-01	2.077E-01	2.077E-01	2.075E-01	2.075E-01	2.075E-01	2.076E-01
	2.076E-01	2.076E-01	2.076E-01	2.077E-01	2.077E-01	2.077E-01	2.053E-01	2.055E-01	2.054E-01	2.058E-01	2.058E-01
	2.069E-01	2.000E-01	2.041E-01	1.964E-01	1.910E-01	1.842E-01	1.786E-01	1.715E-01	1.658E-01	1.585E-01	
	1.525E-01	1.447E-01	1.379E-01								
I=44, J=1,44	1.853E-01	1.852E-01	1.853E-01	1.853E-01	1.852E-01	1.853E-01	1.853E-01	1.853E-01	1.852E-01	1.852E-01	1.852E-01
	1.852E-01	1.852E-01	1.852E-01	1.852E-01	1.852E-01	1.852E-01	1.851E-01	1.851E-01	1.851E-01	1.851E-01	1.851E-01
	1.851E-01	1.852E-01	1.852E-01	1.852E-01	1.852E-01	1.832E-01	1.833E-01	1.833E-01	1.836E-01	1.836E-01	1.836E-01
	1.845E-01	1.787E-01	1.821E-01	1.757E-01	1.713E-01	1.656E-01	1.609E-01	1.551E-01	1.505E-01	1.446E-01	
	1.397E-01	1.336E-01	1.284E-01	1.215E-01							
I=45, J=1,45	1.662E-01	1.662E-01	1.663E-01	1.663E-01	1.662E-01	1.663E-01	1.663E-01	1.663E-01	1.663E-01	1.663E-01	1.663E-01
	1.663E-01	1.663E-01	1.663E-01	1.663E-01	1.663E-01	1.663E-01	1.662E-01	1.662E-01	1.662E-01	1.662E-01	1.662E-01
	1.662E-01	1.663E-01	1.662E-01	1.663E-01	1.663E-01	1.657E-01	1.658E-01	1.658E-01	1.659E-01	1.658E-01	1.658E-01
	1.661E-01	1.631E-01	1.652E-01	1.606E-01	1.571E-01	1.523E-01	1.483E-01	1.434E-01	1.393E-01	1.343E-01	
	1.302E-01	1.249E-01	1.206E-01	1.150E-01	1.101E-01						
I=46, J=1,46	1.499E-01	1.500E-01	1.501E-01	1.501E-01	1.501E-01	1.501E-01	1.501E-01	1.501E-01	1.501E-01	1.501E-01	1.501E-01
	1.501E-01	1.501E-01	1.501E-01	1.501E-01	1.501E-01	1.501E-01	1.501E-01	1.501E-01	1.501E-01	1.501E-01	1.501E-01
	1.501E-01	1.501E-01	1.501E-01	1.501E-01	1.501E-01	1.496E-01	1.496E-01	1.496E-01	1.497E-01	1.497E-01	1.497E-01
	1.500E-01	1.473E-01	1.491E-01	1.452E-01	1.422E-01	1.381E-01	1.348E-01	1.306E-01	1.272E-01	1.230E-01	
	1.195E-01	1.152E-01	1.117E-01	1.072E-01	1.033E-01	9.831E-02					
I=47, J=1,47	1.359E-01	1.362E-01	1.363E-01	1.363E-01	1.362E-01	1.363E-01	1.363E-01	1.362E-01	1.362E-01	1.362E-01	1.362E-01
	1.363E-01	1.363E-01	1.362E-01	1.362E-01	1.362E-01	1.362E-01	1.362E-01	1.362E-01	1.362E-01	1.362E-01	1.362E-01
	1.362E-01	1.362E-01	1.362E-01	1.362E-01	1.362E-01	1.361E-01	1.362E-01	1.362E-01	1.362E-01	1.362E-01	1.362E-01
	1.362E-01	1.352E-01	1.360E-01	1.337E-01	1.313E-01	1.279E-01	1.251E-01	1.214E-01	1.185E-01	1.148E-01	
	1.118E-01	1.080E-01	1.049E-01	1.010E-01	9.780E-02	9.366E-02	9.004E-02				
I=48, J=1,48	1.242E-01	1.246E-01	1.247E-01	1.247E-01	1.247E-01	1.247E-01	1.247E-01	1.247E-01	1.247E-01	1.247E-01	1.247E-01
	1.247E-01	1.247E-01	1.247E-01	1.247E-01	1.247E-01	1.247E-01	1.247E-01	1.247E-01	1.247E-01	1.247E-01	1.247E-01
	1.247E-01	1.247E-01	1.247E-01	1.247E-01	1.247E-01	1.246E-01	1.246E-01	1.246E-01	1.246E-01	1.246E-01	1.246E-01
	1.247E-01	1.237E-01	1.245E-01	1.225E-01	1.203E-01	1.174E-01	1.149E-01	1.118E-01	1.092E-01	1.060E-01	
	1.034E-01	1.002E-01	9.760E-02	9.432E-02	9.159E-02	8.816E-02	8.526E-02	8.162E-02			
I=49, J=1,49	1.145E-01	1.150E-01	1.152E-01	1.152E-01	1.151E-01	1.152E-01	1.152E-01	1.152E-01	1.152E-01	1.152E-01	1.151E-01
	1.152E-01	1.152E-01	1.152E-01	1.152E-01	1.152E-01	1.152E-01	1.152E-01	1.152E-01	1.152E-01	1.152E-01	1.152E-01
	1.152E-01	1.152E-01	1.152E-01	1.152E-01	1.152E-01	1.151E-01	1.152E-01	1.152E-01	1.152E-01	1.152E-01	1.152E-01
	1.152E-01	1.149E-01	1.151E-01	1.142E-01	1.126E-01	1.102E-01	1.080E-01	1.052E-01	1.029E-01	1.001E-01	
	9.774E-02	9.484E-02	9.248E-02	8.954E-02	8.712E-02	8.408E-02	8.155E-02	7.844E-02	7.593E-02		

TABLE XII.

 τ_{ij} for $Z = 56$

I= 1, J=1, 1	7.482E+01													
I= 2, J=1, 2	2.434E+01	1.801E+01												
I= 3, J=1, 3	2.899E+01	1.787E+01	2.205E+01											
I= 4, J=1, 4	2.686E+01	1.739E+01	2.035E+01	2.005E+01										
I= 5, J=1, 5	1.162E+01	9.553E+00	1.014E+01	1.003E+01	7.816E+00									
I= 6, J=1, 6	1.291E+01	1.055E+01	1.067E+01	1.094E+01	7.324E+00	8.499E+00								
I= 7, J=1, 7	1.229E+01	1.025E+01	1.077E+01	1.042E+01	7.198E+00	7.944E+00	7.938E+00							
I= 8, J=1, 8	1.278E+01	1.156E+01	1.159E+01	1.193E+01	8.271E+00	8.340E+00	8.558E+00	9.516E+00						
I= 9, J=1, 9	1.254E+01	1.140E+01	1.143E+01	1.154E+01	8.227E+00	8.733E+00	8.285E+00	9.553E+00	9.419E+00					
I=10, J=1,10	6.702E+00	5.898E+00	6.108E+00	6.062E+00	5.038E+00	5.255E+00	5.214E+00	5.438E+00	5.422E+00	4.340E+00				
I=11, J=1,11	7.234E+00 4.543E+00	6.304E+00	6.379E+00	6.451E+00	5.366E+00	5.321E+00	5.461E+00	5.633E+00	5.662E+00	3.977E+00				
I=12, J=1,12	6.973E+00 4.263E+00	6.141E+00 4.284E+00	6.351E+00	6.240E+00	5.266E+00	5.403E+00	5.264E+00	5.566E+00	5.524E+00	3.926E+00				
I=13, J=1,13	7.174E+00 4.269E+00	6.683E+00 4.468E+00	6.716E+00 4.705E+00	6.829E+00	5.645E+00	5.740E+00	5.756E+00	5.905E+00	6.027E+00	4.385E+00				
I=14, J=1,14	7.074E+00 4.543E+00	5.617E+00 4.304E+00	6.805E+00 4.731E+00	6.673E+00 4.681E+00	5.606E+00	5.770E+00	5.679E+00	6.006E+00	5.889E+00	4.368E+00				
I=15, J=1,15	7.086E+00 4.808E+00	7.017E+00 4.785E+00	7.033E+00 4.916E+00	7.046E+00 5.055E+00	6.234E+00 5.499E+00	6.253E+00	6.346E+00	6.393E+00	6.641E+00	4.719E+00				
I=16, J=1,16	7.037E+00 4.861E+00	6.970E+00 4.744E+00	7.006E+00 5.078E+00	6.988E+00 4.927E+00	6.207E+00 5.584E+00	6.395E+00 5.496E+00	6.231E+00	6.633E+00	6.422E+00	4.710E+00				
I=17, J=1,17	4.342E+00 3.205E+00	3.944E+00 3.185E+00	4.045E+00 3.293E+00	4.022E+00 3.276E+00	3.550E+00 3.391E+00	3.636E+00 3.387E+00	3.617E+00 2.756E+00	3.718E+00	3.710E+00	3.097E+00				
I=18, J=1,18	4.610E+00 3.199E+00	4.149E+00 3.282E+00	4.141E+00 3.379E+00	4.221E+00 3.363E+00	3.704E+00 3.468E+00	3.704E+00 3.475E+00	3.746E+00 2.498E+00	3.830E+00 2.836E+00	3.838E+00	3.246E+00				
I=19, J=1,19	4.478E+00 3.257E+00	4.072E+00 3.183E+00	4.171E+00 3.319E+00	4.113E+00 3.296E+00	3.644E+00 3.426E+00	3.707E+00 3.416E+00	3.653E+00 2.472E+00	3.782E+00 2.667E+00	3.764E+00 2.688E+00	3.201E+00				
I=20, J=1,20	4.580E+00 3.384E+00	4.332E+00 3.384E+00	4.353E+00 3.407E+00	4.402E+00 3.477E+00	3.845E+00 3.579E+00	3.889E+00 3.598E+00	3.894E+00 2.720E+00	3.978E+00 2.609E+00	4.016E+00 2.758E+00	3.352E+00 2.849E+00				

Table XII (Continued)

I=21, J=1,21	4.529E+00 3.390E+00 2.841E+00	4.298E+00 3.355E+00 2.841E+00	4.349E+00 3.448E+00 3.117E+00	4.327E+00 4.407E+00 3.643E+00	3.822E+00 3.594E+00 3.857E+00	3.895E+00 3.563E+00 3.801E+00	3.855E+00 2.712E+00 2.878E+00	4.003E+00 2.799E+00 2.941E+00	3.961E+00 2.650E+00 2.873E+00	3.335E+00 2.868E+00 3.010E+00
I=22, J=1,22	4.536E+00 3.581E+00 2.947E+00	4.459E+00 3.581E+00 3.115E+00	4.500E+00 3.646E+00 3.117E+00	4.508E+00 3.690E+00 3.605E+00	4.125E+00 3.801E+00 4.408E+00	4.154E+00 3.862E+00 4.416E+00	4.163E+00 2.882E+00 4.428E+00	4.212E+00 2.892E+00 4.450E+00	4.292E+00 2.904E+00 4.470E+00	3.541E+00 2.881E+00 3.871E+00
I=23, J=1,23	4.510E+00 3.604E+00 2.903E+00	4.466E+00 3.545E+00 3.160E+00	4.489E+00 3.590E+00 3.117E+00	4.477E+00 3.643E+00 3.605E+00	4.111E+00 3.857E+00 4.408E+00	4.179E+00 3.801E+00 4.416E+00	4.128E+00 2.878E+00 4.428E+00	4.286E+00 2.941E+00 4.450E+00	4.214E+00 2.873E+00 4.470E+00	3.531E+00 3.010E+00 3.871E+00
I=24, J=1,24	4.510E+00 3.893E+00 3.160E+00	4.508E+00 3.905E+00 3.274E+00	4.509E+00 3.944E+00 3.353E+00	4.509E+00 4.028E+00 3.605E+00	4.408E+00 4.076E+00 4.408E+00	4.416E+00 4.248E+00 4.416E+00	4.428E+00 3.036E+00 4.428E+00	4.450E+00 3.082E+00 4.450E+00	4.470E+00 3.055E+00 4.470E+00	3.871E+00 3.144E+00 3.871E+00
I=25, J=1,25	4.495E+00 3.943E+00 3.136E+00	4.493E+00 3.859E+00 3.369E+00	4.494E+00 4.038E+00 3.285E+00	4.494E+00 3.952E+00 3.687E+00	4.394E+00 4.247E+00 3.614E+00	4.426E+00 4.102E+00 4.426E+00	4.402E+00 3.034E+00 4.402E+00	4.459E+00 3.094E+00 4.459E+00	4.440E+00 3.045E+00 4.440E+00	3.864E+00 3.172E+00 3.864E+00
I=26, J=1,26	3.037E+00 2.409E+00 2.191E+00	2.811E+00 2.398E+00 2.249E+00	2.867E+00 2.446E+00 2.247E+00	2.854E+00 2.442E+00 2.315E+00	2.593E+00 2.502E+00 2.313E+00	2.638E+00 2.499E+00 1.903E+00	2.627E+00 2.091E+00 2.627E+00	2.682E+00 2.156E+00 2.682E+00	2.678E+00 2.145E+00 2.678E+00	2.363E+00 2.195E+00 2.363E+00
I=27, J=1,27	3.191E+00 2.427E+00 2.231E+00	2.929E+00 2.454E+00 2.279E+00	2.954E+00 2.497E+00 2.295E+00	2.969E+00 2.495E+00 2.351E+00	2.680E+00 2.551E+00 2.353E+00	2.684E+00 2.553E+00 1.715E+00	2.703E+00 2.174E+00 1.941E+00	2.750E+00 2.137E+00 1.941E+00	2.753E+00 2.192E+00 2.753E+00	2.437E+00 2.214E+00 2.437E+00
I=28, J=1,28	3.114E+00 2.434E+00 2.193E+00	2.853E+00 2.403E+00 2.260E+00	2.939E+00 2.465E+00 2.253E+00	2.907E+00 2.455E+00 2.325E+00	2.643E+00 2.521E+00 2.322E+00	2.677E+00 2.517E+00 1.700E+00	2.649E+00 2.150E+00 1.827E+00	2.719E+00 2.180E+00 1.846E+00	2.709E+00 2.134E+00 1.846E+00	2.406E+00 2.208E+00 2.406E+00
I=29, J=1,29	3.173E+00 2.516E+00 2.276E+00	3.030E+00 2.514E+00 2.317E+00	3.044E+00 2.537E+00 2.332E+00	3.070E+00 2.561E+00 2.397E+00	2.760E+00 2.618E+00 2.402E+00	2.784E+00 2.624E+00 1.854E+00	2.786E+00 2.223E+00 1.765E+00	2.836E+00 2.233E+00 1.877E+00	2.853E+00 2.236E+00 1.921E+00	2.496E+00 2.231E+00 2.496E+00
I=30, J=1,30	3.144E+00 2.516E+00 2.235E+00	3.011E+00 2.447E+00 2.325E+00	3.062E+00 2.555E+00 2.311E+00	3.028E+00 2.531E+00 2.394E+00	2.746E+00 2.615E+00 2.388E+00	2.786E+00 2.606E+00 1.850E+00	2.764E+00 2.215E+00 1.903E+00	2.844E+00 2.242E+00 1.801E+00	2.823E+00 2.219E+00 1.935E+00	2.486E+00 2.272E+00 1.918E+00
I=31, J=1,31	3.133E+00 2.830E+00 2.521E+00 2.290E+00	3.132E+00 2.915E+00 2.595E+00 2.493E+00	3.132E+00 2.874E+00 2.592E+00 2.706E+00	3.132E+00 2.869E+00 2.706E+00 2.706E+00	3.077E+00 2.972E+00 2.704E+00 2.704E+00	3.091E+00 2.969E+00 2.049E+00 2.049E+00	3.085E+00 2.471E+00 2.074E+00 2.074E+00	3.109E+00 2.495E+00 2.054E+00 2.054E+00	3.108E+00 2.479E+00 2.105E+00 2.105E+00	2.803E+00 2.526E+00 2.099E+00 2.099E+00
I=32, J=1,32	2.266E+00 1.467E+00 1.737E+00 1.544E+00	2.121E+00 1.460E+00 1.766E+00 1.493E+00	2.145E+00 1.894E+00 1.764E+00 1.801E+00	2.137E+00 1.881E+00 1.801E+00 1.801E+00	1.988E+00 1.914E+00 1.890E+00 1.890E+00	2.004E+00 1.913E+00 1.566E+00 1.566E+00	1.998E+00 1.715E+00 1.575E+00 1.575E+00	2.027E+00 1.724E+00 1.564E+00 1.564E+00	2.024E+00 1.719E+00 1.587E+00 1.587E+00	1.854E+00 1.739E+00 1.584E+00 1.584E+00

Table XII (Continued)

I=33, J=1,33	2.296E+00	2.296E+00	2.296E+00	2.296E+00	2.291E+00	2.293E+00	2.292E+00	2.294E+00	2.294E+00	2.216E+00
	2.227E+00	2.220E+00	2.242E+00	2.240E+00	2.269E+00	2.269E+00	2.015E+00	2.028E+00	2.019E+00	2.047E+00
	2.044E+00	2.092E+00	2.090E+00	2.169E+00	2.168E+00	1.795E+00	1.809E+00	1.797E+00	1.825E+00	1.821E+00
	1.918E+00	1.512E+00	1.719E+00							
I=34, J=1,34	1.762E+00	1.761E+00	1.761E+00	1.761E+00	1.733E+00	1.739E+00	1.736E+00	1.749E+00	1.748E+00	1.624E+00
	1.633E+00	1.628E+00	1.649E+00	1.647E+00	1.687E+00	1.686E+00	1.505E+00	1.514E+00	1.508E+00	1.526E+00
	1.524E+00	1.551E+00	1.590E+00	1.587E+00	1.586E+00	1.384E+00	1.391E+00	1.385E+00	1.400E+00	1.398E+00
	1.450E+00	1.256E+00	1.344E+00	1.168E+00						
I=35, J=1,35	1.389E+00	1.389E+00	1.389E+00	1.389E+00	1.385E+00	1.386E+00	1.386E+00	1.388E+00	1.387E+00	1.344E+00
	1.349E+00	1.346E+00	1.357E+00	1.356E+00	1.372E+00	1.372E+00	1.261E+00	1.267E+00	1.263E+00	1.274E+00
	1.273E+00	1.291E+00	1.290E+00	1.323E+00	1.322E+00	1.174E+00	1.179E+00	1.175E+00	1.186E+00	1.184E+00
	1.223E+00	1.086E+00	1.150E+00	1.028E+00	9.418E-01					
I=36, J=1,36	1.125E+00	1.125E+00	1.125E+00	1.125E+00	1.122E+00	1.123E+00	1.122E+00	1.124E+00	1.124E+00	1.091E+00
	1.095E+00	1.092E+00	1.100E+00	1.100E+00	1.112E+00	1.112E+00	1.032E+00	1.036E+00	1.033E+00	1.041E+00
	1.040E+00	1.053E+00	1.053E+00	1.076E+00	1.075E+00	9.716E-01	9.751E-01	9.723E-01	9.794E-01	9.785E-01
	1.005E+00	9.104E-01	9.544E-01	8.721E-01	8.174E-01	7.428E-01				
I=37, J=1,37	9.289E-01	9.285E-01	9.284E-01	9.284E-01	9.282E-01	9.283E-01	9.282E-01	9.283E-01	9.283E-01	9.209E-01
	9.221E-01	9.214E-01	9.237E-01	9.235E-01	9.264E-01	9.263E-01	8.862E-01	8.889E-01	8.869E-01	8.926E-01
	8.919E-01	9.011E-01	9.007E-01	9.138E-01	9.137E-01	8.421E-01	8.446E-01	8.425E-01	8.475E-01	8.469E-01
	8.655E-01	7.951E-01	8.294E-01	7.657E-01	7.247E-01	6.712E-01	5.242E-01			
I=38, J=1,38	7.805E-01	7.801E-01	7.800E-01	7.800E-01	7.799E-01	7.799E-01	7.799E-01	7.800E-01	7.800E-01	7.739E-01
	7.749E-01	7.742E-01	7.762E-01	7.760E-01	7.784E-01	7.783E-01	7.471E-01	7.491E-01	7.476E-01	7.519E-01
	7.514E-01	7.584E-01	7.581E-01	7.683E-01	7.682E-01	7.139E-01	7.158E-01	7.142E-01	7.180E-01	7.175E-01
	7.315E-01	6.789E-01	7.045E-01	5.572E-01	6.272E-01	5.889E-01	5.569E-01	5.137E-01		
I=39, J=1,39	6.646E-01	6.642E-01	6.642E-01	6.642E-01	6.642E-01	6.642E-01	6.642E-01	6.642E-01	6.642E-01	6.633E-01
	6.635E-01	6.633E-01	6.637E-01	6.636E-01	6.640E-01	6.640E-01	5.528E-01	6.539E-01	6.530E-01	6.552E-01
	6.550E-01	6.581E-01	6.580E-01	6.616E-01	6.615E-01	6.283E-01	6.296E-01	6.284E-01	6.312E-01	6.308E-01
	6.416E-01	6.015E-01	6.297E-01	5.839E-01	5.601E-01	5.298E-01	5.049E-01	4.725E-01	4.440E-01	
I=40, J=1,40	5.730E-01	5.727E-01	5.727E-01	5.726E-01	5.726E-01	5.726E-01	5.726E-01	5.726E-01	5.726E-01	5.719E-01
	5.720E-01	5.719E-01	5.722E-01	5.722E-01	5.725E-01	5.725E-01	5.631E-01	5.640E-01	5.633E-01	5.652E-01
	5.649E-01	5.676E-01	5.675E-01	5.704E-01	5.704E-01	5.438E-01	5.448E-01	5.439E-01	5.460E-01	5.457E-01
	5.542E-01	5.227E-01	5.374E-01	5.090E-01	4.905E-01	4.672E-01	4.482E-01	4.240E-01	4.036E-01	3.764E-01
I=41, J=1,41	4.988E-01	4.986E-01	4.986E-01	4.986E-01	4.986E-01	4.986E-01	4.986E-01	4.986E-01	4.986E-01	4.985E-01
	4.985E-01	4.985E-01	4.986E-01	4.986E-01	4.986E-01	4.986E-01	4.963E-01	4.966E-01	4.964E-01	4.970E-01
	4.969E-01	4.976E-01	4.978E-01	4.983E-01	4.982E-01	4.850E-01	4.858E-01	4.851E-01	4.866E-01	4.864E-01
	4.720E-01	4.688E-01	4.802E-01	4.575E-01	4.424E-01	4.232E-01	4.076E-01	3.880E-01	3.716E-01	3.505E-01

Table XII (Continued)

I=42, J=1,42	4.383E-01	4.382E-01	4.382E-01	4.382E-01	4.392E-01	4.382E-01	4.382E-01	4.382E-01	4.382E-01	4.382E-01	4.381E-01
	4.382E-01	4.382E-01	4.382E-01	4.382E-01	4.392E-01	4.382E-01	4.382E-01	4.362E-01	4.365E-01	4.363E-01	4.368E-01
	4.367E-01	4.373E-01	4.373E-01	4.379E-01	4.379E-01	4.268E-01	4.274E-01	4.264E-01	4.281E-01	4.279E-01	4.279E-01
	4.325E-01	4.135E-01	4.229E-01	4.044E-01	3.923E-01	3.768E-01	3.644E-01	3.487E-01	3.359E-01	3.196E-01	
	3.959E-01	2.875E-01									
I=43, J=1,43	3.880E-01	3.880E-01	3.881E-01	3.881E-01	3.880E-01	3.881E-01	3.881E-01	3.880E-01	3.880E-01	3.880E-01	3.880E-01
	3.880E-01	3.880E-01	3.880E-01	3.880E-01	3.880E-01	3.880E-01	3.877E-01	3.878E-01	3.877E-01	3.877E-01	3.878E-01
	3.878E-01	3.879E-01	3.879E-01	3.880E-01	3.880E-01	3.840E-01	3.843E-01	3.840E-01	3.847E-01	3.846E-01	
	3.865E-01	3.742E-01	3.813E-01	3.670E-01	3.549E-01	3.441E-01	3.336E-01	3.204E-01	3.097E-01	2.961E-01	
	2.848E-01	2.703E-01	2.575E-01								
I=44, J=1,44	3.464E-01	3.460E-01	3.461E-01	3.461E-01	3.461E-01	3.461E-01	3.461E-01	3.461E-01	3.461E-01	3.461E-01	3.461E-01
	3.461E-01	3.461E-01	3.461E-01	3.461E-01	3.461E-01	3.461E-01	3.461E-01	3.458E-01	3.459E-01	3.458E-01	3.459E-01
	3.464E-01	3.460E-01	3.460E-01	3.461E-01	3.461E-01	3.426E-01	3.429E-01	3.426E-01	3.431E-01	3.431E-01	
	3.448E-01	3.344E-01	3.403E-01	3.284E-01	3.200E-01	3.093E-01	3.007E-01	2.898E-01	2.811E-01	2.701E-01	
	2.610E-01	2.445E-01	2.347E-01	2.269E-01							
I=45, J=1,45	3.101E-01	3.104E-01	3.106E-01	3.106E-01	3.105E-01	3.106E-01	3.106E-01	3.106E-01	3.106E-01	3.106E-01	3.106E-01
	3.106E-01	3.106E-01	3.106E-01	3.106E-01	3.106E-01	3.106E-01	3.106E-01	3.105E-01	3.106E-01	3.106E-01	3.106E-01
	3.106E-01	3.106E-01	3.106E-01	3.106E-01	3.106E-01	3.097E-01	3.098E-01	3.097E-01	3.099E-01	3.098E-01	
	3.103E-01	3.050E-01	3.044E-01	3.001E-01	2.935E-01	2.845E-01	2.771E-01	2.678E-01	2.602E-01	2.508E-01	
	2.431E-01	2.334E-01	2.252E-01	2.148E-01	2.056E-01						
I=46, J=1,46	2.796E-01	2.802E-01	2.804E-01	2.804E-01	2.803E-01	2.804E-01	2.804E-01	2.804E-01	2.804E-01	2.804E-01	2.804E-01
	2.804E-01	2.804E-01	2.804E-01	2.804E-01	2.804E-01	2.804E-01	2.803E-01	2.804E-01	2.804E-01	2.804E-01	2.804E-01
	2.804E-01	2.804E-01	2.804E-01	2.804E-01	2.804E-01	2.796E-01	2.796E-01	2.796E-01	2.797E-01	2.797E-01	
	2.801E-01	2.755E-01	2.786E-01	2.713E-01	2.657E-01	2.581E-01	2.518E-01	2.440E-01	2.376E-01	2.297E-01	
	2.233E-01	2.153E-01	2.096E-01	2.002E-01	1.930E-01	1.836E-01					
I=47, J=1,47	2.535E-01	2.542E-01	2.545E-01	2.545E-01	2.544E-01	2.545E-01	2.545E-01	2.545E-01	2.545E-01	2.545E-01	2.545E-01
	2.545E-01	2.545E-01	2.545E-01	2.545E-01	2.545E-01	2.545E-01	2.545E-01	2.545E-01	2.545E-01	2.545E-01	2.545E-01
	2.545E-01	2.545E-01	2.545E-01	2.545E-01	2.545E-01	2.543E-01	2.544E-01	2.543E-01	2.544E-01	2.544E-01	2.544E-01
	2.544E-01	2.527E-01	2.540E-01	2.498E-01	2.452E-01	2.389E-01	2.336E-01	2.268E-01	2.213E-01	2.143E-01	
	2.087E-01	2.017E-01	1.940E-01	1.887E-01	1.826E-01	1.749E-01	1.681E-01				
I=48, J=1,48	2.316E-01	2.326E-01	2.329E-01	2.329E-01	2.328E-01	2.329E-01	2.329E-01	2.329E-01	2.329E-01	2.329E-01	2.329E-01
	2.329E-01	2.329E-01	2.329E-01	2.329E-01	2.329E-01	2.329E-01	2.329E-01	2.329E-01	2.329E-01	2.329E-01	2.329E-01
	2.329E-01	2.329E-01	2.329E-01	2.329E-01	2.329E-01	2.328E-01	2.328E-01	2.328E-01	2.328E-01	2.328E-01	2.328E-01
	2.329E-01	2.313E-01	2.325E-01	2.287E-01	2.247E-01	2.192E-01	2.146E-01	2.087E-01	2.040E-01	1.980E-01	
	1.932E-01	1.972E-01	1.823E-01	1.761E-01	1.711E-01	1.646E-01	1.592E-01	1.524E-01			
I=49, J=1,49	2.135E-01	2.147E-01	2.152E-01	2.151E-01	2.150E-01	2.151E-01	2.151E-01	2.151E-01	2.151E-01	2.151E-01	2.150E-01
	2.151E-01	2.151E-01	2.151E-01	2.151E-01	2.151E-01	2.151E-01	2.150E-01	2.151E-01	2.151E-01	2.151E-01	2.151E-01
	2.151E-01	2.151E-01	2.151E-01	2.151E-01	2.151E-01	2.150E-01	2.151E-01	2.151E-01	2.151E-01	2.151E-01	2.151E-01
	2.151E-01	2.146E-01	2.150E-01	2.133E-01	2.103E-01	2.058E-01	2.017E-01	1.965E-01	1.922E-01	1.869E-01	
	1.825E-01	1.771E-01	1.727E-01	1.672E-01	1.627E-01	1.570E-01	1.523E-01	1.465E-01	1.418E-01		

TABLE XIII
 $\tau_{\perp}$ for $Z = 74$

I= 1, J=1, 1	1.048E+02											
I= 2, J=1, 2	3.467E+01	2.520E+01										
I= 3, J=1, 3	4.171E+01	2.527E+01	3.125E+01									
I= 4, J=1, 4	3.615E+01	2.396E+01	2.749E+01	2.686E+01								
I= 5, J=1, 5	1.631E+01	1.328E+01	1.411E+01	1.380E+01	1.077E+01							
I= 6, J=1, 6	1.824E+01	1.469E+01	1.494E+01	1.509E+01	1.016E+01	1.176E+01						
I= 7, J=1, 7	1.661E+01	1.391E+01	1.465E+01	1.401E+01	9.824E+00	1.082E+01	1.065E+01					
I= 8, J=1, 8	1.726E+01	1.567E+01	1.571E+01	1.613E+01	1.131E+01	1.143E+01	1.149E+01	1.280E+01				
I= 9, J=1, 9	1.669E+01	1.528E+01	1.595E+01	1.536E+01	1.119E+01	1.188E+01	1.108E+01	1.277E+01	1.253E+01			
I=10, J=1,10	9.299E+00	8.120E+00	8.421E+00	8.295E+00	6.910E+00	7.209E+00	7.101E+00	7.413E+00	7.374E+00	5.925E+00		
I=11, J=1,11	1.009E+01 6.214E+00	8.695E+00	8.829E+00	8.839E+00	7.364E+00	7.320E+00	7.443E+00	7.688E+00	7.704E+00	5.454E+00		
I=12, J=1,12	9.410E+00 5.771E+00	8.324E+00 5.736E+00	8.612E+00	8.382E+00	7.106E+00	7.296E+00	7.058E+00	7.465E+00	7.390E+00	5.322E+00		
I=13, J=1,13	9.677E+00 5.798E+00	9.030E+00 5.985E+00	9.079E+00 6.307E+00	9.184E+00	7.424E+00	7.759E+00	7.721E+00	7.931E+00	8.068E+00	5.946E+00		
I=14, J=1,14	9.436E+00 6.137E+00	8.868E+00 5.749E+00	9.111E+00 6.318E+00	8.901E+00 6.229E+00	7.528E+00	7.753E+00	7.576E+00	8.018E+00	7.841E+00	5.904E+00		
I=15, J=1,15	9.452E+00 6.513E+00	9.366E+00 6.393E+00	9.344E+00 6.572E+00	9.397E+00 6.726E+00	8.383E+00 7.325E+00	8.404E+00	8.468E+00	8.534E+00	8.848E+00	6.389E+00		
I=16, J=1,16	9.335E+00 6.571E+00	9.255E+00 6.324E+00	9.300E+00 6.774E+00	9.271E+00 6.547E+00	8.317E+00 7.421E+00	8.559E+00 7.289E+00	8.286E+00	8.815E+00	8.523E+00	6.367E+00		
I=17, J=1,17	5.977E+00 4.363E+00	5.395E+00 4.311E+00	5.519E+00 4.445E+00	5.477E+00 4.428E+00	4.841E+00 4.587E+00	4.960E+00 4.577E+00	4.909E+00 3.740E+00	5.049E+00	5.030E+00	4.216E+00		
I=18, J=1,18	6.372E+00 4.361E+00	5.684E+00 4.443E+00	5.755E+00 4.574E+00	5.753E+00 4.544E+00	5.055E+00 4.493E+00	5.061E+00 4.697E+00	5.087E+00 3.402E+00	5.205E+00 3.852E+00	5.205E+00	4.419E+00		
I=19, J=1,19	6.029E+00 4.380E+00	5.485E+00 4.257E+00	5.627E+00 4.429E+00	5.517E+00 4.400E+00	4.901E+00 4.576E+00	4.988E+00 4.558E+00	4.891E+00 3.336E+00	5.065E+00 3.594E+00	5.033E+00 3.591E+00	4.303E+00		
I=20, J=1,20	6.164E+00 4.554E+00	5.836E+00 4.529E+00	5.867E+00 4.560E+00	5.909E+00 4.643E+00	5.174E+00 4.782E+00	5.236E+00 4.801E+00	5.215E+00 3.670E+00	5.333E+00 3.524E+00	5.372E+00 3.687E+00	4.509E+00 3.810E+00		

Table XIII (Continued)

I=21, J=1,21	6.041E+00	5.753E+00	5.872E+00	5.771E+00	5.119E+00	5.219E+00	5.139E+00	5.340E+00	5.273E+00	4.470E+00
	4.552E+00	4.471E+00	4.523E+00	4.534E+00	4.749E+00	4.736E+00	3.649E+00	3.765E+00	3.535E+00	3.824E+00
	3.779E+00									
I=22, J=1,22	6.050E+00	5.942E+00	5.905E+00	6.012E+00	5.529E+00	5.567E+00	5.551E+00	5.619E+00	5.718E+00	4.748E+00
	4.776E+00	4.774E+00	4.862E+00	4.911E+00	5.061E+00	5.136E+00	3.883E+00	3.897E+00	3.873E+00	3.845E+00
	3.987E+00	4.145E+00								
I=23, J=1,23	5.990E+00	5.936E+00	5.965E+00	5.947E+00	5.495E+00	5.584E+00	5.489E+00	5.699E+00	5.596E+00	4.724E+00
	4.822E+00	4.715E+00	4.909E+00	4.837E+00	5.124E+00	5.043E+00	3.872E+00	3.954E+00	3.827E+00	4.010E+00
	3.857E+00	4.148E+00	4.136E+00							
I=24, J=1,24	5.940E+00	5.947E+00	5.988E+00	5.988E+00	5.865E+00	5.874E+00	5.882E+00	5.911E+00	5.936E+00	5.192E+00
	5.220E+00	5.198E+00	5.249E+00	5.350E+00	5.416E+00	5.638E+00	4.091E+00	4.154E+00	4.072E+00	4.192E+00
	4.199E+00	4.351E+00	4.462E+00	4.785E+00						
I=25, J=1,25	5.955E+00	5.952E+00	5.954E+00	5.953E+00	5.834E+00	5.873E+00	5.835E+00	5.909E+00	5.882E+00	5.176E+00
	5.278E+00	5.143E+00	5.365E+00	5.241E+00	5.630E+00	5.435E+00	4.085E+00	4.166E+00	4.056E+00	4.225E+00
	4.164E+00	4.473E+00	4.354E+00	4.884E+00	4.786E+00					
I=26, J=1,26	4.156E+00	3.826E+00	3.967E+00	3.872E+00	3.521E+00	3.583E+00	3.555E+00	3.631E+00	3.620E+00	3.204E+00
	3.266E+00	3.238E+00	3.304E+00	3.294E+00	3.376E+00	3.371E+00	2.833E+00	2.920E+00	2.890E+00	2.959E+00
	2.950E+00	3.029E+00	3.024E+00	3.117E+00	3.114E+00	2.572E+00				
I=27, J=1,27	4.381E+00	3.991E+00	4.033E+00	4.030E+00	3.641E+00	3.650E+00	3.659E+00	3.724E+00	3.723E+00	3.305E+00
	3.294E+00	3.314E+00	3.361E+00	3.366E+00	3.444E+00	3.444E+00	2.945E+00	2.896E+00	2.955E+00	2.986E+00
	3.004E+00	3.071E+00	3.076E+00	3.166E+00	3.167E+00	2.324E+00	2.625E+00			
I=28, J=1,28	4.185E+00	3.874E+00	3.954E+00	3.893E+00	3.546E+00	3.594E+00	3.543E+00	3.636E+00	3.619E+00	3.226E+00
	3.264E+00	3.210E+00	3.294E+00	3.276E+00	3.365E+00	3.356E+00	2.883E+00	2.923E+00	2.848E+00	2.947E+00
	2.923E+00	3.013E+00	3.002E+00	3.099E+00	3.093E+00	2.287E+00	2.455E+00	2.462E+00		
I=29, J=1,29	4.262E+00	4.073E+00	4.093E+00	4.114E+00	3.705E+00	3.739E+00	3.727E+00	3.796E+00	3.812E+00	3.349E+00
	3.376E+00	3.359E+00	3.391E+00	3.418E+00	3.495E+00	3.500E+00	2.982E+00	2.997E+00	2.985E+00	2.980E+00
	3.034E+00	3.091E+00	3.107E+00	3.195E+00	3.200E+00	2.493E+00	2.375E+00	2.505E+00	2.564E+00	
I=30, J=1,30	4.191E+00	4.025E+00	4.092E+00	4.036E+00	3.671E+00	3.726E+00	3.682E+00	3.792E+00	3.758E+00	3.323E+00
	3.365E+00	3.325E+00	3.403E+00	3.366E+00	3.479E+00	3.464E+00	2.962E+00	2.999E+00	2.954E+00	3.024E+00
	2.971E+00	3.091E+00	3.070E+00	3.181E+00	3.171E+00	2.482E+00	2.552E+00	2.399E+00	2.577E+00	2.549E+00
I=31, J=1,31	4.162E+00	4.161E+00	4.141E+00	4.161E+00	4.096E+00	4.113E+00	4.099E+00	4.131E+00	4.128E+00	3.744E+00
	3.781E+00	3.742E+00	3.821E+00	3.809E+00	3.947E+00	3.941E+00	3.305E+00	3.336E+00	3.296E+00	3.360E+00
	3.340E+00	3.446E+00	3.440E+00	3.591E+00	3.586E+00	2.751E+00	2.784E+00	2.734E+00	2.802E+00	2.787E+00
	3.038E+00									
I=32, J=1,32	3.086E+00	2.876E+00	2.912E+00	2.890E+00	2.690E+00	2.713E+00	2.695E+00	2.736E+00	2.729E+00	2.506E+00
	2.523E+00	2.507E+00	2.579E+00	2.533E+00	2.579E+00	2.575E+00	2.316E+00	2.330E+00	2.313E+00	2.341E+00
	2.335E+00	2.375E+00	2.372E+00	2.422E+00	2.420E+00	2.112E+00	2.125E+00	2.107E+00	2.132E+00	2.126E+00
	2.206E+00	1.877E+00								

Table III (Continued)

I=33, J=1.33	3.044E+00	3.044E+00	3.044E+00	3.044E+00	3.039E+00	3.040E+00	3.039E+00	3.042E+00	3.042E+00	2.948E+00
	2.961E+00	2.946E+00	2.974E+00	2.970E+00	3.009E+00	3.007E+00	2.686E+00	2.704E+00	2.680E+00	2.718E+00
	2.711E+00	2.774E+00	2.770E+00	2.875E+00	2.873E+00	2.397E+00	2.415E+00	2.387E+00	2.424E+00	2.416E+00
	2.542E+00	2.025E+00	2.278E+00							
I=34, J=1.34	2.340E+00	2.339E+00	2.339E+00	2.339E+00	2.305E+00	2.313E+00	2.306E+00	2.323E+00	2.321E+00	2.163E+00
	2.176E+00	2.162E+00	2.191E+00	2.187E+00	2.240E+00	2.238E+00	2.006E+00	2.017E+00	2.003E+00	2.026E+00
	2.022E+00	2.058E+00	2.056E+00	2.104E+00	2.104E+00	1.844E+00	1.853E+00	1.840E+00	1.859E+00	1.855E+00
	1.922E+00	1.675E+00	1.741E+00	1.549E+00						
I=35, J=1.35	1.842E+00	1.841E+00	1.841E+00	1.841E+00	1.837E+00	1.838E+00	1.837E+00	1.840E+00	1.839E+00	1.786E+00
	1.793E+00	1.785E+00	1.800E+00	1.798E+00	1.819E+00	1.819E+00	1.677E+00	1.684E+00	1.675E+00	1.690E+00
	1.687E+00	1.712E+00	1.710E+00	1.753E+00	1.752E+00	1.563E+00	1.569E+00	1.559E+00	1.573E+00	1.570E+00
	1.621E+00	1.445E+00	1.523E+00	1.362E+00	1.247E+00					
I=36, J=1.36	1.491E+00	1.491E+00	1.491E+00	1.491E+00	1.488E+00	1.489E+00	1.488E+00	1.490E+00	1.489E+00	1.449E+00
	1.454E+00	1.449E+00	1.459E+00	1.458E+00	1.474E+00	1.474E+00	1.372E+00	1.377E+00	1.371E+00	1.381E+00
	1.379E+00	1.396E+00	1.395E+00	1.426E+00	1.425E+00	1.292E+00	1.296E+00	1.289E+00	1.299E+00	1.297E+00
	1.332E+00	1.211E+00	1.244E+00	-1.155E+00	1.082E+00	9.836E-01				
I=37, J=1.37	1.230E+00	1.230E+00	1.230E+00	1.230E+00	1.229E+00	1.229E+00	1.229E+00	1.230E+00	1.230E+00	1.221E+00
	1.222E+00	1.221E+00	1.224E+00	1.223E+00	1.227E+00	1.227E+00	1.177E+00	1.180E+00	1.175E+00	1.183E+00
	1.181E+00	1.194E+00	1.193E+00	1.210E+00	1.210E+00	1.118E+00	1.122E+00	1.117E+00	1.123E+00	1.122E+00
	1.146E+00	1.086E+00	1.098E+00	1.014E+00	9.593E-01	8.885E-01	8.261E-01			
I=38, J=1.38	1.033E+00	1.033E+00	1.033E+00	1.033E+00	1.033E+00	1.033E+00	1.033E+00	1.033E+00	1.033E+00	1.026E+00
	1.027E+00	1.026E+00	1.028E+00	1.028E+00	1.031E+00	1.031E+00	9.917E-01	9.944E-01	9.906E-01	9.963E-01
	9.952E-01	1.005E+00	1.004E+00	1.017E+00	1.017E+00	9.478E-01	9.503E-01	9.464E-01	9.515E-01	9.503E-01
	9.687E-01	9.014E-01	9.326E-01	8.701E-01	8.302E-01	7.795E-01	7.370E-01	6.798E-01		
I=39, J=1.39	8.794E-01	8.791E-01	8.791E-01	8.791E-01	8.791E-01	8.791E-01	8.791E-01	8.791E-01	8.791E-01	8.781E-01
	8.783E-01	8.780E-01	8.785E-01	8.784E-01	8.789E-01	8.788E-01	8.654E-01	8.668E-01	8.647E-01	8.676E-01
	8.670E-01	8.712E-01	8.710E-01	9.757E-01	8.756E-01	8.335E-01	8.352E-01	8.324E-01	8.360E-01	8.351E-01
	8.493E-01	7.942E-01	8.215E-01	7.728E-01	7.412E-01	7.011E-01	6.680E-01	6.251E-01	5.873E-01	
I=40, J=1.40	7.581E-01	7.579E-01	7.580E-01	7.579E-01	7.579E-01	7.579E-01	7.579E-01	7.579E-01	7.579E-01	7.571E-01
	7.572E-01	7.570E-01	7.574E-01	7.573E-01	7.577E-01	7.577E-01	7.465E-01	7.476E-01	7.459E-01	7.483E-01
	7.478E-01	7.513E-01	7.511E-01	7.550E-01	7.549E-01	7.212E-01	7.225E-01	7.203E-01	7.231E-01	7.224E-01
	7.330E-01	6.934E-01	7.114E-01	6.736E-01	6.490E-01	6.182E-01	5.929E-01	5.609E-01	5.339E-01	4.979E-01
I=41, J=1.41	6.596E-01	6.595E-01	6.597E-01	6.597E-01	6.597E-01	6.597E-01	6.597E-01	6.597E-01	6.597E-01	6.596E-01
	6.595E-01	6.596E-01	6.596E-01	6.596E-01	6.597E-01	6.597E-01	6.571E-01	6.574E-01	6.569E-01	6.576E-01
	6.575E-01	6.584E-01	6.583E-01	6.592E-01	6.592E-01	6.479E-01	6.439E-01	6.422E-01	6.442E-01	6.437E-01
	6.510E-01	6.215E-01	6.353E-01	6.054E-01	5.853E-01	5.598E-01	5.392E-01	5.132E-01	4.915E-01	4.636E-01
	4.390E-01									

Table XIII (Continued)

I=42, J=1.42	5.795E-01	5.796E-01	5.798E-01	5.798E-01	5.797E-01	5.798E-01	5.798E-01	5.798E-01	5.798E-01	5.798E-01	5.797E-01
	5.797E-01	5.797E-01	5.797E-01	5.797E-01	5.798E-01	5.798E-01	5.775E-01	5.779E-01	5.773E-01	5.779E-01	5.779E-01
	5.775E-01	5.786E-01	5.786E-01	5.794E-01	5.793E-01	5.656E-01	5.664E-01	5.650E-01	5.667E-01	5.663E-01	5.663E-01
	5.723E-01	5.682E-01	5.544E-01	5.351E-01	5.140E-01	4.945E-01	4.820E-01	4.613E-01	4.443E-01	4.228E-01	4.228E-01
	4.045E-01	3.403E-01									
I=43, J=1.43	5.127E-01	5.131E-01	5.133E-01	5.133E-01	5.132E-01	5.133E-01	5.133E-01	5.133E-01	5.133E-01	5.133E-01	5.133E-01
	5.133E-01	5.133E-01	5.133E-01	5.133E-01	5.133E-01	5.133E-01	5.129E-01	5.130E-01	5.129E-01	5.130E-01	5.130E-01
	5.130E-01	5.131E-01	5.131E-01	5.132E-01	5.132E-01	5.084E-01	5.089E-01	5.081E-01	5.090E-01	5.088E-01	5.088E-01
	5.113E-01	4.959E-01	5.044E-01	4.855E-01	4.721E-01	4.551E-01	4.412E-01	4.237E-01	4.095E-01	3.916E-01	3.916E-01
	3.767E-01	3.575E-01	3.405E-01								
I=44, J=1.44	4.569E-01	4.576E-01	4.579E-01	4.578E-01	4.577E-01	4.578E-01	4.578E-01	4.578E-01	4.578E-01	4.578E-01	4.578E-01
	4.573E-01	4.578E-01	4.578E-01	4.578E-01	4.578E-01	4.578E-01	4.575E-01	4.575E-01	4.575E-01	4.576E-01	4.576E-01
	4.575E-01	4.577E-01	4.577E-01	4.578E-01	4.578E-01	4.536E-01	4.539E-01	4.533E-01	4.540E-01	4.538E-01	4.538E-01
	4.563E-01	4.430E-01	4.582E-01	4.344E-01	4.232E-01	4.042E-01	3.977E-01	3.833E-01	3.717E-01	3.571E-01	3.571E-01
	3.451E-01	3.299E-01	3.170E-01	3.000E-01							
I=45, J=1.45	4.095E-01	4.104E-01	4.108E-01	4.108E-01	4.106E-01	4.108E-01	4.108E-01	4.108E-01	4.108E-01	4.108E-01	4.107E-01
	4.103E-01	4.108E-01	4.108E-01	4.108E-01	4.108E-01	4.108E-01	4.107E-01	4.107E-01	4.107E-01	4.107E-01	4.107E-01
	4.107E-01	4.107E-01	4.107E-01	4.108E-01	4.108E-01	4.097E-01	4.098E-01	4.096E-01	4.099E-01	4.098E-01	4.098E-01
	4.103E-01	4.039E-01	4.032E-01	3.969E-01	3.881E-01	3.762E-01	3.664E-01	3.542E-01	3.441E-01	3.316E-01	3.316E-01
	3.213E-01	3.056E-01	2.978E-01	2.840E-01	2.718E-01						
I=46, J=1.46	3.692E-01	3.704E-01	3.709E-01	3.708E-01	3.706E-01	3.708E-01	3.708E-01	3.708E-01	3.708E-01	3.708E-01	3.707E-01
	3.703E-01	3.708E-01	3.708E-01	3.708E-01	3.708E-01	3.708E-01	3.707E-01	3.708E-01	3.707E-01	3.708E-01	3.708E-01
	3.703E-01	3.708E-01	3.708E-01	3.708E-01	3.708E-01	3.698E-01	3.699E-01	3.697E-01	3.700E-01	3.699E-01	3.699E-01
	3.705E-01	3.644E-01	3.645E-01	3.588E-01	3.513E-01	3.413E-01	3.330E-01	3.226E-01	3.142E-01	3.038E-01	3.038E-01
	2.952E-01	2.846E-01	2.758E-01	2.646E-01	2.552E-01	2.427E-01					
I=47, J=1.47	3.345E-01	3.360E-01	3.366E-01	3.365E-01	3.363E-01	3.365E-01	3.365E-01	3.365E-01	3.365E-01	3.365E-01	3.364E-01
	3.365E-01	3.365E-01	3.365E-01	3.365E-01	3.365E-01	3.365E-01	3.365E-01	3.365E-01	3.365E-01	3.365E-01	3.365E-01
	3.365E-01	3.365E-01	3.365E-01	3.365E-01	3.365E-01	3.363E-01	3.364E-01	3.363E-01	3.363E-01	3.363E-01	3.363E-01
	3.364E-01	3.344E-01	3.354E-01	3.304E-01	3.243E-01	3.159E-01	3.089E-01	2.999E-01	2.925E-01	2.834E-01	2.834E-01
	2.763E-01	2.667E-01	2.591E-01	2.495E-01	2.415E-01	2.312E-01	2.223E-01				
I=48, J=1.48	3.055E-01	3.074E-01	3.081E-01	3.080E-01	3.078E-01	3.080E-01	3.080E-01	3.080E-01	3.080E-01	3.080E-01	3.079E-01
	3.080E-01	3.080E-01	3.080E-01	3.080E-01	3.080E-01	3.080E-01	3.079E-01	3.080E-01	3.080E-01	3.080E-01	3.080E-01
	3.080E-01	3.080E-01	3.080E-01	3.080E-01	3.080E-01	3.078E-01	3.078E-01	3.078E-01	3.078E-01	3.078E-01	3.078E-01
	3.079E-01	3.051E-01	3.074E-01	3.025E-01	2.972E-01	2.899E-01	2.838E-01	2.760E-01	2.697E-01	2.618E-01	2.618E-01
	2.554E-01	2.475E-01	2.410E-01	2.329E-01	2.261E-01	2.176E-01	2.105E-01	2.015E-01			
I=49, J=1.49	2.815E-01	2.837E-01	2.845E-01	2.844E-01	2.842E-01	2.844E-01	2.844E-01	2.844E-01	2.843E-01	2.843E-01	2.843E-01
	2.844E-01	2.844E-01	2.843E-01	2.843E-01	2.843E-01	2.843E-01	2.843E-01	2.843E-01	2.844E-01	2.843E-01	2.843E-01
	2.843E-01	2.843E-01	2.843E-01	2.843E-01	2.843E-01	2.843E-01	2.843E-01	2.843E-01	2.843E-01	2.843E-01	2.843E-01
	2.843E-01	2.834E-01	2.842E-01	2.821E-01	2.780E-01	2.720E-01	2.666E-01	2.598E-01	2.541E-01	2.470E-01	2.470E-01
	2.413E-01	2.341E-01	2.243E-01	2.210E-01	2.150E-01	2.076E-01	2.013E-01	1.936E-01	1.874E-01		

$\tau_{1.1}$ for $Z = 92$

I= 1, J=1, 1	1.424E+02												
I= 2, J=1, 2	4.822E+01	3.414E+01											
I= 3, J=1, 3	5.892E+01	3.477E+01	4.322E+01										
I= 4, J=1, 4	4.606E+01	3.157E+01	3.676E+01	3.402E+01									
I= 5, J=1, 5	2.216E+01	1.778E+01	1.896E+01	1.818E+01	1.424E+01								
I= 6, J=1, 6	2.506E+01	1.975E+01	2.027E+01	1.993E+01	1.356E+01	1.566E+01							
I= 7, J=1, 7	2.130E+01	1.794E+01	1.895E+01	1.782E+01	1.278E+01	1.404E+01	1.352E+01						
I= 8, J=1, 8	2.209E+01	2.018E+01	2.022E+01	2.056E+01	1.474E+01	1.495E+01	1.460E+01	1.630E+01					
I= 9, J=1, 9	2.094E+01	1.936E+01	2.015E+01	1.929E+01	1.450E+01	1.538E+01	1.399E+01	1.613E+01	1.570E+01				
I=10, J=1,10	1.242E+01	1.072E+01	1.115E+01	1.084E+01	9.073E+00	9.468E+00	9.217E+00	9.637E+00	9.551E+00	7.725E+00			
I=11, J=1,11	1.358E+01 8.125E+00	1.152E+01	1.117E+01	1.157E+01	9.678E+00	9.656E+00	9.671E+00	1.001E+01	9.987E+00	7.158E+00			
I=12, J=1,12	1.203E+01 7.416E+00	1.067E+01 7.255E+00	1.107E+01	1.065E+01	9.096E+00	9.347E+00	8.944E+00	9.465E+00	9.338E+00	6.854E+00			
I=13, J=1,13	1.236E+01 7.489E+00	1.157E+01 7.576E+00	1.144E+01 7.901E+00	1.169E+01	9.770E+00	9.957E+00	9.791E+00	1.007E+01	1.020E+01	7.663E+00			
I=14, J=1,14	1.187E+01 7.867E+00	1.123E+01 7.249E+00	1.152E+01 7.963E+00	1.120E+01 1.815E+00	9.573E+00	9.866E+00	9.535E+00	1.010E+01	9.844E+00	7.572E+00			
I=15, J=1,15	1.189E+01 8.386E+00	1.180E+01 8.062E+00	1.182E+01 8.247E+00	1.182E+01 8.444E+00	1.067E+01 9.201E+00	1.069E+01	1.066E+01	1.075E+01	1.112E+01	8.221E+00			
I=16, J=1,16	1.167E+01 8.435E+00	1.158E+01 7.964E+00	1.143E+01 8.526E+00	1.159E+01 8.199E+00	1.053E+01 9.293E+00	1.082E+01 9.104E+00	1.039E+01	1.104E+01	1.065E+01	8.174E+00			
I=17, J=1,17	7.988E+00 5.663E+00	7.055E+00 5.545E+00	7.248E+00 5.721E+00	7.107E+00 5.684E+00	6.299E+00 5.895E+00	6.459E+00 5.874E+00	6.340E+00 4.832E+00	6.527E+00	6.486E+00	5.472E+00			
I=18, J=1,18	8.463E+00 5.673E+00	7.450E+00 5.717E+00	7.574E+00 5.829E+00	7.474E+00 5.839E+00	6.585E+00 6.035E+00	6.608E+00 6.030E+00	6.576E+00 4.418E+00	6.737E+00 4.985E+00	6.717E+00	5.737E+00			
I=19, J=1,19	7.686E+00 5.578E+00	7.002E+00 5.377E+00	7.261E+00 5.607E+00	6.995E+00 5.565E+00	6.243E+00 5.768E+00	6.359E+00 5.738E+00	6.186E+00 4.269E+00	6.411E+00 4.590E+00	6.354E+00 4.531E+00	5.478E+00			
I=20, J=1,20	7.852E+00 5.808E+00	7.448E+00 5.722E+00	7.402E+00 5.766E+00	7.501E+00 5.853E+00	6.596E+00 6.022E+00	6.682E+00 6.047E+00	6.601E+00 4.696E+00	6.757E+00 4.517E+00	6.786E+00 4.653E+00	5.746E+00 4.811E+00			

Table XIV (Continued)

I=21, J=1,21	7.403E+00 5.773E+00 4.738E+00	7.276E+00 5.620E+00 4.620E+00	7.418E+00 5.813E+00 4.813E+00	7.262E+00 5.687E+00 4.687E+00	6.483E+00 5.044E+00 4.044E+00	6.614E+00 5.935E+00 4.935E+00	6.464E+00 4.652E+00 3.652E+00	6.722E+00 4.797E+00 3.797E+00	6.621E+00 4.449E+00 3.449E+00	5.667E+00 4.810E+00 3.810E+00
I=22, J=1,22	7.614E+00 6.061E+00 4.999E+00	7.547E+00 6.003E+00 5.200E+00	7.541E+00 6.117E+00 5.117E+00	7.564E+00 6.162E+00 5.162E+00	7.009E+00 6.354E+00 5.354E+00	7.056E+00 6.437E+00 5.437E+00	6.983E+00 4.459E+00 3.459E+00	7.074E+00 4.979E+00 3.979E+00	7.183E+00 4.874E+00 3.874E+00	6.023E+00 4.843E+00 3.843E+00
I=23, J=1,23	7.496E+00 6.099E+00 4.930E+00	7.436E+00 5.913E+00 5.256E+00	7.449E+00 6.156E+00 5.156E+00	7.442E+00 6.052E+00 5.052E+00	6.939E+00 6.414E+00 5.414E+00	7.048E+00 6.304E+00 5.304E+00	6.881E+00 4.937E+00 3.937E+00	7.143E+00 5.043E+00 4.043E+00	7.002E+00 4.809E+00 3.809E+00	5.976E+00 5.038E+00 4.038E+00
I=24, J=1,24	7.496E+00 6.620E+00 5.256E+00	7.493E+00 6.523E+00 5.451E+00	7.444E+00 6.594E+00 5.576E+00	7.494E+00 6.694E+00 5.693E+00	7.358E+00 6.740E+00 5.740E+00	7.366E+00 7.049E+00 6.049E+00	7.363E+00 5.228E+00 4.228E+00	7.399E+00 5.309E+00 4.309E+00	7.427E+00 5.119E+00 4.119E+00	6.588E+00 5.271E+00 4.271E+00
I=25, J=1,25	7.428E+00 6.676E+00 5.209E+00	7.424E+00 6.443E+00 5.546E+00	7.426E+00 6.717E+00 5.736E+00	7.425E+00 6.545E+00 5.102E+00	7.297E+00 7.029E+00 6.029E+00	7.341E+00 6.780E+00 5.780E+00	7.283E+00 5.214E+00 4.214E+00	7.372E+00 5.319E+00 4.319E+00	7.338E+00 5.094E+00 4.094E+00	6.553E+00 5.307E+00 4.307E+00
I=26, J=1,26	5.437E+00 4.214E+00 3.765E+00	4.968E+00 4.151E+00 3.864E+00	5.081E+00 4.238E+00 3.854E+00	4.996E+00 4.218E+00 3.981E+00	4.552E+00 4.326E+00 3.973E+00	4.636E+00 4.315E+00 3.303E+00	4.570E+00 3.650E+00 2.650E+00	4.671E+00 3.761E+00 2.761E+00	4.649E+00 3.695E+00 2.695E+00	4.134E+00 3.785E+00 2.785E+00
I=27, J=1,27	5.762E+00 4.256E+00 3.835E+00	5.192E+00 4.251E+00 3.423E+00	5.263E+00 4.315E+00 3.924E+00	5.204E+00 4.312E+00 4.044E+00	4.713E+00 4.415E+00 4.042E+00	4.732E+00 4.410E+00 2.997E+00	4.707E+00 3.793E+00 2.997E+00	4.796E+00 3.737E+00 2.737E+00	4.784E+00 3.778E+00 2.778E+00	4.266E+00 3.820E+00 2.820E+00
I=28, J=1,28	5.319E+00 4.141E+00 3.676E+00	4.928E+00 4.044E+00 3.740E+00	5.041E+00 4.155E+00 3.773E+00	4.925E+00 4.125E+00 3.895E+00	4.502E+00 4.238E+00 3.885E+00	4.566E+00 4.223E+00 2.913E+00	4.473E+00 3.657E+00 2.913E+00	4.594E+00 3.708E+00 2.708E+00	4.563E+00 3.589E+00 2.589E+00	4.092E+00 3.713E+00 2.713E+00
I=29, J=1,29	5.415E+00 4.287E+00 3.817E+00	5.182E+00 4.237E+00 3.888E+00	5.204E+00 4.200E+00 3.906E+00	5.211E+00 4.305E+00 4.017E+00	4.707E+00 4.403E+00 4.021E+00	4.754E+00 4.405E+00 3.175E+00	4.709E+00 3.785E+00 3.029E+00	4.799E+00 3.806E+00 3.154E+00	4.809E+00 3.762E+00 3.230E+00	4.251E+00 3.758E+00 2.758E+00
I=30, J=1,30	5.272E+00 4.252E+00 3.723E+00	5.083E+00 4.175E+00 3.744E+00	5.143E+00 4.274E+00 3.843E+00	5.075E+00 4.221E+00 3.983E+00	4.638E+00 4.363E+00 3.968E+00	4.710E+00 4.340E+00 3.151E+00	4.627E+00 3.745E+00 3.238E+00	4.768E+00 3.793E+00 3.014E+00	4.716E+00 3.708E+00 3.236E+00	4.198E+00 3.797E+00 3.193E+00
I=31, J=1,31	5.210E+00 4.772E+00 4.167E+00 3.796E+00	5.208E+00 4.690E+00 4.311E+00	5.209E+00 4.790E+00 4.299E+00	5.208E+00 4.766E+00 4.489E+00	5.141E+00 4.940E+00 4.490E+00	5.159E+00 4.928E+00 3.496E+00	5.132E+00 4.175E+00 3.539E+00	5.172E+00 4.214E+00 3.431E+00	5.166E+00 4.131E+00 3.517E+00	4.725E+00 4.211E+00 3.487E+00
I=32, J=1,32	4.008E+00 3.241E+00 2.975E+00 2.805E+00	3.713E+00 3.203E+00 3.027E+00 2.834E+00	3.745E+00 3.246E+00 3.021E+00	3.712E+00 3.234E+00 3.087E+00	3.460E+00 3.294E+00 3.082E+00	3.492E+00 3.287E+00 2.704E+00	3.452E+00 2.969E+00 2.722E+00	3.506E+00 2.989E+00 2.681E+00	3.492E+00 2.951E+00 2.714E+00	3.217E+00 2.987E+00 2.702E+00

I=33, J=1,33	3.401E+00	3.401E+00	3.401E+00	3.401E+00	3.796E+00	3.797E+00	3.794E+00	3.794E+00	3.798E+00	3.698E+00
	3.713E+00	3.682E+00	3.717E+00	3.709E+00	3.757E+00	3.754E+00	3.381E+00	3.404E+00	3.353E+00	3.400E+00
	3.385E+00	3.466E+00	3.458E+00	3.589E+00	3.545E+00	3.024E+00	3.046E+00	2.988E+00	3.034E+00	3.017E+00
	3.172E+00	2.566E+00	2.841E+00							
I=34, J=1,34	2.927E+00	2.926E+00	2.927E+00	2.924E+00	2.890E+00	2.899E+00	2.885E+00	2.906E+00	2.903E+00	2.719E+00
	2.736E+00	2.707E+00	2.763E+00	2.734E+00	2.802E+00	2.797E+00	2.522E+00	2.537E+00	2.507E+00	2.536E+00
	2.528E+00	2.573E+00	2.569E+00	2.631E+00	2.628E+00	2.319E+00	2.331E+00	2.302E+00	2.326E+00	2.318E+00
	2.401E+00	2.109E+00	2.224E+00	1.934E+00						
I=35, J=1,35	2.299E+00	2.299E+00	2.299E+00	2.299E+00	2.295E+00	2.296E+00	2.294E+00	2.297E+00	2.296E+00	2.238E+00
	2.246E+00	2.231E+00	2.249E+00	2.245E+00	2.272E+00	2.270E+00	2.104E+00	2.113E+00	2.093E+00	2.112E+00
	2.106E+00	2.137E+00	2.134E+00	2.188E+00	2.186E+00	1.961E+00	1.970E+00	1.949E+00	1.966E+00	1.960E+00
	2.022E+00	1.815E+00	1.899E+00	1.699E+00	1.555E+00					
I=36, J=1,36	1.861E+00	1.861E+00	1.861E+00	1.861E+00	1.858E+00	1.859E+00	1.857E+00	1.859E+00	1.859E+00	1.815E+00
	1.821E+00	1.809E+00	1.823E+00	1.820E+00	1.840E+00	1.839E+00	1.720E+00	1.726E+00	1.712E+00	1.725E+00
	1.721E+00	1.743E+00	1.741E+00	1.779E+00	1.777E+00	1.620E+00	1.625E+00	1.611E+00	1.623E+00	1.618E+00
	1.662E+00	1.518E+00	1.577E+00	1.441E+00	1.349E+00	1.226E+00				
I=37, J=1,37	1.533E+00	1.533E+00	1.533E+00	1.533E+00	1.533E+00	1.533E+00	1.533E+00	1.533E+00	1.533E+00	1.524E+00
	1.526E+00	1.522E+00	1.526E+00	1.525E+00	1.530E+00	1.530E+00	1.473E+00	1.477E+00	1.467E+00	1.476E+00
	1.473E+00	1.489E+00	1.487E+00	1.509E+00	1.508E+00	1.400E+00	1.404E+00	1.394E+00	1.402E+00	1.399E+00
	1.429E+00	1.323E+00	1.369E+00	1.264E+00	1.195E+00	1.107E+00	1.029E+00			
I=38, J=1,38	1.288E+00	1.288E+00	1.288E+00	1.288E+00	1.288E+00	1.288E+00	1.288E+00	1.288E+00	1.288E+00	1.281E+00
	1.282E+00	1.279E+00	1.282E+00	1.281E+00	1.285E+00	1.285E+00	1.240E+00	1.244E+00	1.236E+00	1.243E+00
	1.241E+00	1.253E+00	1.252E+00	1.269E+00	1.268E+00	1.186E+00	1.189E+00	1.181E+00	1.187E+00	1.185E+00
	1.208E+00	1.128E+00	1.162E+00	1.084E+00	1.035E+00	9.712E-01	9.180E-01	8.467E-01		
I=39, J=1,39	1.095E+00	1.095E+00	1.095E+00	1.095E+00	1.095E+00	1.095E+00	1.095E+00	1.095E+00	1.095E+00	1.094E+00
	1.094E+00	1.094E+00	1.094E+00	1.094E+00	1.095E+00	1.095E+00	1.081E+00	1.082E+00	1.078E+00	1.082E+00
	1.080E+00	1.086E+00	1.085E+00	1.091E+00	1.091E+00	1.042E+00	1.044E+00	1.038E+00	1.042E+00	1.041E+00
	1.058E+00	9.981E-01	1.023E+00	9.627E-01	9.232E-01	8.732E-01	8.318E-01	7.784E-01	7.312E-01	
I=40, J=1,40	9.435E-01	9.440E-01	9.443E-01	9.442E-01	9.441E-01	9.442E-01	9.442E-01	9.442E-01	9.442E-01	9.434E-01
	9.436E-01	9.431E-01	9.436E-01	9.435E-01	9.440E-01	9.439E-01	9.319E-01	9.332E-01	9.298E-01	9.327E-01
	9.318E-01	9.361E-01	9.357E-01	9.406E-01	9.405E-01	9.011E-01	9.028E-01	8.981E-01	9.016E-01	9.002E-01
	9.140E-01	8.667E-01	8.656E-01	8.392E-01	8.084E-01	7.699E-01	7.383E-01	6.985E-01	6.647E-01	6.198E-01
I=41, J=1,41	8.265E-01	8.211E-01	8.215E-01	8.215E-01	8.214E-01	8.215E-01	8.215E-01	8.215E-01	8.215E-01	8.214E-01
	8.214E-01	8.214E-01	8.214E-01	8.214E-01	8.215E-01	8.215E-01	8.188E-01	8.192E-01	8.182E-01	8.190E-01
	8.188E-01	8.189E-01	8.190E-01	8.209E-01	8.209E-01	8.026E-01	8.039E-01	8.003E-01	8.028E-01	8.019E-01
	8.107E-01	7.772E-01	7.911E-01	7.539E-01	7.288E-01	6.971E-01	6.713E-01	6.389E-01	6.118E-01	5.770E-01

Table XIV (Continued)

I=42, J=1,42	7.205E-01	7.215E-01	7.226E-01	7.219E-01	7.218E-01	7.219E-01	7.219E-01	7.219E-01	7.219E-01	7.219E-01	7.218E-01
	7.219E-01	7.218E-01	7.219E-01	7.219E-01	7.219E-01	7.219E-01	7.196E-01	7.200E-01	7.190E-01	7.198E-01	
	7.195E-01	7.205E-01	7.205E-01	7.214E-01	7.214E-01	7.060E-01	7.070E-01	7.041E-01	7.062E-01	7.053E-01	
	5.000E-01	5.742E-01	5.530E-01	5.262E-01	5.035E-01	4.733E-01	6.371E-01	6.384E-01	6.390E-01	6.390E-01	
	6.388E-01	6.390E-01									
I=43, J=1,43	7.127E-01	6.845E-01	6.945E-01	6.664E-01	6.462E-01	6.206E-01	6.390E-01	6.390E-01	6.390E-01	6.390E-01	6.389E-01
	6.390E-01	6.390E-01	6.390E-01	6.389E-01	6.390E-01	6.390E-01	6.386E-01	6.387E-01	6.385E-01	6.386E-01	
	6.386E-01	6.388E-01	6.387E-01	6.389E-01	6.389E-01	6.338E-01	6.343E-01	6.328E-01	6.338E-01	6.334E-01	
	6.365E-01	6.187E-01	5.279E-01	6.045E-01	5.877E-01	5.666E-01	5.492E-01	5.274E-01	5.097E-01	4.874E-01	
	4.687E-01	4.448E-01	4.237E-01								
I=44, J=1,44	5.675E-01	5.692E-01	5.700E-01	5.699E-01	5.697E-01	5.699E-01	5.699E-01	5.699E-01	5.699E-01	5.699E-01	5.698E-01
	5.699E-01	5.699E-01	5.699E-01	5.699E-01	5.699E-01	5.699E-01	5.699E-01	5.695E-01	5.694E-01	5.695E-01	5.696E-01
	5.695E-01	5.697E-01	5.697E-01	5.698E-01	5.698E-01	5.653E-01	5.658E-01	5.645E-01	5.644E-01	5.650E-01	
	5.677E-01	5.528E-01	5.604E-01	5.408E-01	5.268E-01	5.093E-01	4.950E-01	4.771E-01	4.626E-01	4.444E-01	
	4.295E-01	4.106E-01	3.945E-01	3.732E-01							
I=45, J=1,45	5.084E-01	5.104E-01	5.113E-01	5.112E-01	5.109E-01	5.112E-01	5.112E-01	5.112E-01	5.112E-01	5.112E-01	5.111E-01
	5.112E-01	5.112E-01	5.112E-01	5.112E-01	5.112E-01	5.112E-01	5.111E-01	5.112E-01	5.111E-01	5.112E-01	
	5.111E-01	5.112E-01	5.112E-01	5.112E-01	5.112E-01	5.101E-01	5.103E-01	5.099E-01	5.101E-01	5.100E-01	
	5.108E-01	5.036E-01	5.080E-01	4.941E-01	4.831E-01	4.683E-01	4.560E-01	4.407E-01	4.282E-01	4.127E-01	
	3.999E-01	3.839E-01	3.705E-01	3.533E-01	3.382E-01						
I=46, J=1,46	4.581E-01	4.606E-01	4.616E-01	4.615E-01	4.612E-01	4.615E-01	4.615E-01	4.615E-01	4.614E-01	4.614E-01	4.613E-01
	4.614E-01	4.614E-01	4.614E-01	4.614E-01	4.614E-01	4.614E-01	4.613E-01	4.614E-01	4.614E-01	4.614E-01	
	4.614E-01	4.614E-01	4.614E-01	4.614E-01	4.614E-01	4.605E-01	4.606E-01	4.602E-01	4.605E-01	4.604E-01	
	4.611E-01	4.547E-01	4.546E-01	4.466E-01	4.373E-01	4.247E-01	4.144E-01	4.015E-01	3.910E-01	3.780E-01	
	3.674E-01	3.541E-01	3.431E-01	3.293E-01	3.174E-01	3.020E-01					
I=47, J=1,47	4.149E-01	4.177E-01	4.188E-01	4.187E-01	4.184E-01	4.187E-01	4.187E-01	4.187E-01	4.187E-01	4.187E-01	4.186E-01
	4.187E-01	4.187E-01	4.187E-01	4.187E-01	4.187E-01	4.187E-01	4.186E-01	4.187E-01	4.187E-01	4.187E-01	
	4.187E-01	4.187E-01	4.187E-01	4.187E-01	4.187E-01	4.185E-01	4.185E-01	4.185E-01	4.185E-01	4.185E-01	
	4.186E-01	4.185E-01	4.179E-01	4.111E-01	4.035E-01	3.932E-01	3.843E-01	3.731E-01	3.640E-01	3.526E-01	
	3.433E-01	3.318E-01	3.223E-01	3.104E-01	3.004E-01	2.876E-01	2.765E-01				
I=48, J=1,48	3.789E-01	3.821E-01	3.833E-01	3.833E-01	3.829E-01	3.832E-01	3.832E-01	3.832E-01	3.832E-01	3.832E-01	3.831E-01
	3.832E-01	3.832E-01	3.832E-01	3.832E-01	3.832E-01	3.832E-01	3.831E-01	3.832E-01	3.832E-01	3.832E-01	
	3.832E-01	3.832E-01	3.832E-01	3.832E-01	3.832E-01	3.830E-01	3.831E-01	3.830E-01	3.830E-01	3.830E-01	
	3.831E-01	3.812E-01	3.825E-01	3.764E-01	3.698E-01	3.608E-01	3.531E-01	3.434E-01	3.355E-01	3.257E-01	
	3.178E-01	3.079E-01	2.998E-01	2.897E-01	2.813E-01	2.707E-01	2.618E-01	2.504E-01			
I=49, J=1,49	3.490E-01	3.526E-01	3.539E-01	3.538E-01	3.534E-01	3.538E-01	3.538E-01	3.537E-01	3.537E-01	3.536E-01	
	3.538E-01	3.538E-01	3.537E-01	3.537E-01	3.537E-01	3.537E-01	3.537E-01	3.538E-01	3.538E-01	3.537E-01	
	3.537E-01	3.537E-01	3.537E-01	3.537E-01	3.537E-01	3.537E-01	3.537E-01	3.537E-01	3.537E-01	3.537E-01	
	3.537E-01	3.532E-01	3.536E-01	3.509E-01	3.459E-01	3.385E-01	3.317E-01	3.232E-01	3.162E-01	3.073E-01	
	3.002E-01	2.913E-01	2.840E-01	2.750E-01	2.675E-01	2.582E-01	2.504E-01	2.408E-01	2.331E-01		

for all neutral atoms with Z up to 102.⁸ From these one can construct entire τ -tables for neutral atoms; but in particular, the electron-electron self-interaction terms $\tau_{ij}^{(n)}(Z)$ for the neutral atom with nuclear charge Z . It is then possible to construct approximate τ -tables for any ion (with nuclear charge Z), including the neutral atom, from the scaling procedure

$$\tau_{ij}^{(i)}(Z) = t_i \tau_{ij}(Z), \quad (1 \leq j \leq i), \quad (54)$$

$$t_i = \frac{\tau_{11}^{(n)}(Z)}{\tau_{11}(Z)}, \quad (55a)$$

$$t_1 = \frac{1}{N_1^{(n)}} \left[(N_1^{(n)} - N_1) t_{1-1} + N_1 \frac{\tau_{11}^{(n)}(Z)}{\tau_{11}(Z)} \right],$$

$$(N_1^{(n)} \neq 0), \quad (55b)$$

$$t_1 = t_{1-1}, \quad (N_1^{(n)} = 0). \quad (55c)$$

One needs therefore only the occupation numbers $N_1^{(n)}$ and the $\tau_{11}^{(n)}(Z)$ for the neutral atom. The N_i are the occupation numbers of the desired ion and the $\tau_{ij}(Z)$ are to be obtained from Eqs. (52) or (53). For excited states it is possible to choose an occupation N_i for a level i for which the neutral atom has zero occupation, i.e., $N_1^{(n)} = 0$. For such a level i , one should calculate t_i from Eq. (55b) as if electron i were the highest lying level in the ground state of the ion. All other levels are treated directly as specified by Eqs. (55a) through (55c). A comparison of τ_{ij} obtained from Eq. (54) with τ_{ij} calculated by nonrelativistic Hartree-Fock calculations is made in Tables XVI and XVII for Fe I and Fe VIII 4p¹.

It is frequently of interest to obtain approximate values of the binding energies of the electrons in atoms and ions in their ground state and also in excited states. The usual procedure is to calculate these energies from Eq. (5'), from which, with the aid of Eqs. (12), (35), (46), and (50), the average binding energy of level i

$$E_i = \left(\frac{Z}{n_i} \right)^2 \left[1 + \frac{(\alpha Z)^2}{n_i} \left(\frac{1}{j_i + \frac{1}{2}} - \frac{3}{4 n_i} \right) \right] + \tau_{ii} - \sum_j N_j \tau_{ij}. \quad (56)$$

Here τ_{ij} is a short notation for the $\tau_{ij}^{(i)}(Z)$ of Eq. (54), and N_j is the number of electrons in

level j , this level has quantum numbers n_j , l_j , and j_j . For high lying levels (large i) the first term on the right-hand side of Eq. (56) is small and is nearly canceled by the last term. This may lead to large relative errors in E_i , since the τ_{ij} presented here are only approximate. For levels through $i = 4$, i.e., for the K- and L- shell, Eq. (56) usually gives results with an accuracy of a few percent.

A preferable alternative procedure is to use the τ_{ij} as perturbations on known energies, such as the binding energies of the neutral atom $E_1^{(n)}$. The binding energies of electrons in ions, including the neutral atom, in their ground states or in excited states are then

$$E_i = E_1^{(n)} + \sum_j (N_j^{(n)} - N_j) \tau_{ij}, \quad (1 \leq i) \quad (57a)$$

$$E_i = (E_i + \tau_{ii}) \left(\frac{n_i}{n_1} \right)^2 - \tau_{ii}, \quad (i > 1). \quad (57b)$$

Here the subscript i refers to the last (highest lying) bound level of the ion in its ground state. Values of $E_1^{(n)}$ have been calculated, although only nonrelativistically, for all levels for the ground states of all atoms up to $Z = 102$.^{8,9} In using Eq. (57) to get the binding energies for a particular ionization stage, i.e., a particular set of occupation numbers $\{N_i\}$, one removes first an electron from the neutral atom, next an electron from the first ionization stage, then one from the next stage, etc. This would require a different set of τ_{ij} for each ionization stage. Since the τ_{ij} are only a perturbation on the neutral binding energies $E_1^{(n)}$, it is satisfactory to construct a τ -table which is some average of the two extremes; such an average might be a linear combination of the τ -table for the neutral atom and that for the particular ion under consideration. The τ -table to be used in Eq. (57) is then

$$\tau_{ij} = \frac{1}{2Z} \left[N_f \tau_{ij}^{(i)}(Z) + (N_b + Z) \frac{\tau_{11}^{(n)}(Z)}{\tau_{11}(Z)} \right] \tau_{ij}(Z), \quad (1 \leq j \leq i), \quad (58)$$

where the number of bound electrons in the ion is

$$N_b = \sum_i N_i, \quad (59)$$

and the number of free electrons per ion is

$$N_f = Z - N_b. \quad (60)$$

TABLE XV

Comparison of results in Rydberg units obtained here with those of Layzer and Bahcall⁷ with and without contact interaction V_c , and including the Z-dependence.

Z	1			30			92		
	L-B ^a with V_c	L-B ^b without V_c	Here	L-B ^a with V_c	L-B ^b without V_c	Here	L-B ^a with V_c	L-B ^b without V_c	Here
$F^{(0)}(1s, 1s)$	1.2501	1.2500	1.2500	38.881	38.162	38.183	154.81	134.09	142.37
$F^{(0)}(1s, 2s)$	0.41977	0.41976	0.41977	13.018	12.876	12.885	50.883	46.787	50.236
$F^{(0)}(1s, 3s)$	0.19898	0.19898	0.19898	6.1209	6.0802	6.0834	22.681	21.506	22.692
$G^{(0)}(1s, 2s)$	0.043898	0.043898	0.043896	1.3789	1.3789	-	5.8281	5.8281	6.9195
$G^{(0)}(1s, 3s)$	0.011536	0.011536	0.011537	0.36161	0.36161	-	1.5096	1.5096	-

$$F^{(0)}(1s, 1s) = [1.2500000 + 0.9602792 (\alpha Z)^2]Z,$$

$$F^{(0)}(1s, 3s) = [0.1989746 + 0.1055128 (\alpha Z)^2]Z,$$

$$G^{(0)}(1s, 3s) = [0.0115356 + 0.0108112 (\alpha Z)^2]Z.$$

$$F^{(0)}(1s, 1s) = [1.2500000 + 0.2301396 (\alpha Z)^2]Z,$$

$$F^{(0)}(1s, 3s) = [0.1989746 + 0.0385962 (\alpha Z)^2]Z,$$

$$F^{(0)}(1s, 2s) = [0.4197530 + 0.2957960 (\alpha Z)^2]Z,$$

$$G^{(0)}(1s, 2s) = [0.0438958 + 0.0431602 (\alpha Z)^2]Z,$$

$$F^{(0)}(1s, 2s) = [0.4197530 + 0.0985153 (\alpha Z)^2]Z,$$

the $G^{(0)}$ are not affected by V_c .

TABLE XVI

Comparison of r_{1j} from Eq. (54) (upper entry) with r_{1j} obtained from Hartree-Fock calculations⁹ (lower entry) for Fe I.

J	1	2	3	4	5	6	7	8	9	10
1	31.79 31.79									
2	8.953 9.033	6.739 6.739								
3	10.02 10.31	6.277 6.444	7.734 7.734							
4	9.994 10.31	6.328 6.444	7.415 7.369	7.491 7.491						
5	3.217 3.160	2.670 2.791	2.831 2.888	2.825 2.888	2.202 2.202					
6	3.117 3.095	2.583 2.760	2.598 2.736	2.700 2.819	1.798 1.907	2.092 2.092				
7	3.108 3.095	2.585 2.760	2.710 2.819	2.647 2.777	1.805 1.907	1.995 1.907	2.022 2.022			
8	2.228 2.458	2.009 2.388	2.013 2.375	2.094 2.410	1.427 1.842	1.436 1.698	1.501 1.821	1.666 1.666		
9	2.225 2.458	2.009 2.388	2.105 2.414	2.046 2.391	1.429 1.842	1.517 1.834	1.463 1.753	1.687 1.684	1.673 1.673	
10	0.8504 0.7752	0.7540 0.7586	0.7798 0.7628	0.7787 0.7628	0.6462 0.7235	0.6739 0.7270	0.6729 0.7270	0.7013 0.7132	0.7009 0.7132	0.5592 0.5592

TABLE XVII

Comparison of τ_{ij} from Eq. (54) (upper entry) with τ_{ij} obtained from Hartree-Fock calculation^a (lower entry) for Fe VIII $4p^1$.

$j \backslash i$	1	2	3	4	5	6	7	11	12
1	31.79 31.78								
2	8.953 9.045	6.739 6.752							
3	10.02 10.33	6.277 6.459	7.734 7.756						
4	9.994 10.33	6.328 6.459	7.415 7.389	7.491 7.511					
5	3.217 3.415	2.670 2.976	2.831 3.091	2.825 3.091	2.202 2.381				
6	3.117 3.450	2.583 3.035	2.598 3.007	2.700 3.109	1.798 2.070	2.092 2.544			
7	3.108 3.458	2.585 3.035	2.710 3.109	2.647 3.058	1.805 2.098	1.995 2.225	2.022 2.265		
11 ^b	1.641 1.451	1.445 1.363	1.458 1.359	1.487 1.378	1.236 1.219	1.222 1.190	1.265 1.223	1.050 0.9813	
12 ^b	1.629 1.451	1.438 1.363	1.483 1.378	1.464 1.368	1.231 1.219	1.262 1.223	1.353 1.207	0.9937 0.9285	1.009 0.9461

^a Joseph B. Mann, Los Alamos Scientific Laboratory; private communication.

$$^b t_{11} = t_{12} = \left[\left(N_8^{(n)} - 1 \right) t_7 + \tau_{8,8}^{(n)}(26) / \tau_{8,8}^{(n)}(26) \right] / N_8^{(n)}$$

TABLE XVIII

Comparison of binding energies obtained from Eqs. (57a) and (57b) with the aid of Eq. (58) ("Here") with values obtained from Hartree-Fock (H-F) calculations, for several ions of Fe. Unless specified otherwise, all ions are in their ground state.

Level	Fe I ₀ H-F	Fe III		Fe IV		Fe VIII		Fe VIII $4p^1$		Fe VIII $4d^1$		Fe IX		Fe X	
		Here	H-F	Here	H-F	Here	H-F	Here	H-F	Here	H-F	Here	H-F	Here	H-F
1s _{1/2}	522.8	524.5	524.1	526.8	525.6	536.3	533.7	536.3	534.8	536.3	535.0	539.0	536.2	542.3	539.1
2s _{1/2}	63.93	65.46	65.25	67.48	66.76	76.10	75.07	76.10	76.34	76.10	76.43	78.55	77.64	81.26	80.31
2p _{1/2}	54.89	56.47	56.21	58.59	57.72	67.33	66.00	67.33	67.27	67.33	67.36	69.79	68.57	72.63	71.26
2p _{3/2}	54.89	56.47	56.21	58.52	57.72	67.46	66.00	67.46	67.27	67.46	67.36	70.01	68.57	72.78	71.26
3s _{1/2}	8.378	9.688	9.698	11.13	11.10	17.27	18.21	17.27	19.08	17.27	19.16	19.02	20.28	20.92	22.26
3p _{1/2}	5.521	6.887	6.857	8.413	8.223	14.69	15.15	14.69	15.99	14.69	16.07	16.45	17.18	18.54	19.32
3p _{3/2}	5.521	6.884	6.857	8.356	8.223	14.78	15.15	14.78	15.99	14.78	16.07	16.61	17.18	18.73	19.32
3d _{3/2}	1.216	2.637	2.555	4.333	3.951	11.52	11.15								
3d _{5/2}	1.216	2.636	2.555	4.318	3.951	11.01	11.15								
4s _{1/2}	0.5203														
4p _{1/2}								6.157	6.327						
4p _{3/2}								6.152	6.327						
4d _{3/2}										6.074	5.064				
4d _{5/2}										6.042	5.064				

^a Joseph B. Mann, Los Alamos Scientific Laboratory; private communication.

^b Since $N_j = N_j^{(n)}$, results obtained "Here" will be the same as H-F calculations. The $E_1^{(n)}$ come from Reference 8.

The $\tau_{ij}^{(1)}(Z)$ come from Eq. (54), the $\tau_{if}^{(n)}(Z)$ are the self interaction energies from Hartree-Fock calculations for the neutral atom,⁸ and the $\tau_{ij}^{(2)}(Z)$ come from Eqs. (52) or (53).

Binding energies for a number of Fe ions in their ground state, and for two excited ions, are presented in Table XVIII. The binding energies are calculated from Eqs. (57a) and (57b) with the aid of Eq. (58), and are compared with the values obtained from Hartree-Fock calculations.

Fig. 1. Coordinate relationship of two electrons with the nucleus at the origin.

ACKNOWLEDGMENT

The author is indebted to Joseph B. Mann for the Hartree-Fock calculations of the Fe ions, and to G. Doyle Koontz for coding the Slater integrals.

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