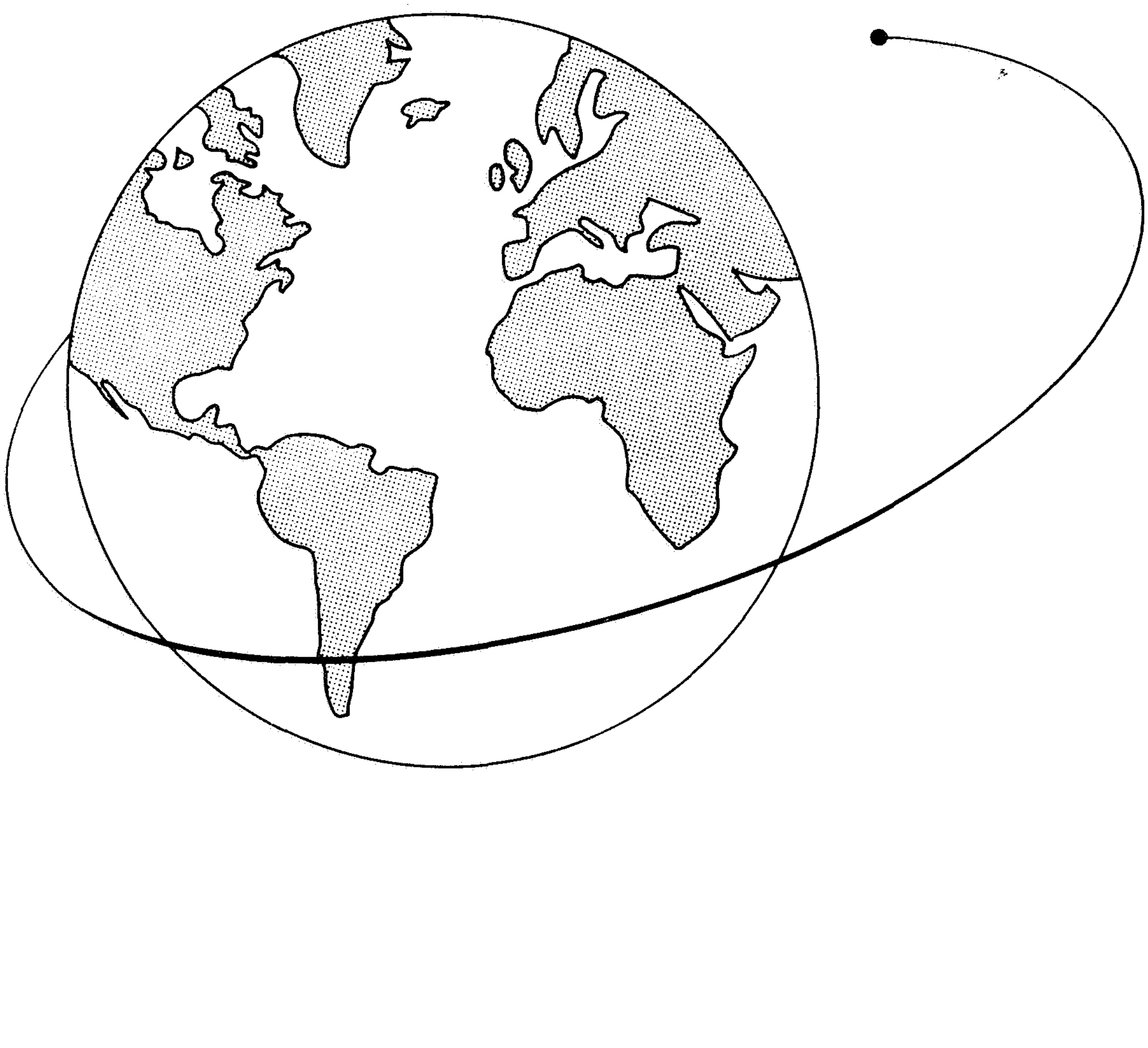
SECOND-ORDER PLANETARY THEORY PART I

S. E. HAMID



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Part I: Outline of the Method

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ABSTRACT

The analytical procedure for computing second-order perturbations in rectangular coordinates, according to Brouwer's theory of planetary motion, is given. Single- and double-harmonic analyses and the multiplication of Fourier series with numerical coefficients are used in the computations. In the series multiplication, a variable tolerance is considered, enabling us to avoid the difficulties arising from a small divisor.

Also presented is an example computing that part of the second-order perturbation of Mars containing the masses of Jupiter and Saturn. The analytical solution of this perturbation is compared with the numerical integration of the differential equations defining this perturbation. The numerical integration covered the interval from 0 to 40,000 days. The comparison shows an agreement within 1×10^{-9}.

RESUME

La procédure analytique de calcul des perturbations de second ordre en coordonnées rectangulaires, d'après la théorie de Brouwer des mouvements planétaires, est exposée. Des analyses d'harmoniques simples et doubles et la multiplication de séries de Fourier avec des coëfficients numériques sont utilisées dans les calculs. Dans la multiplication de séries on tient compte d'une tolérance variable qui permet d'éviter les difficultés provenant d'un petit diviseur.

Un exemple de calcul de la perturbation de second ordre de Mars due aux masses de Jupiter et Saturne est également présenté. La solution analytique de cette perturbation est comparée avec l'intégration numérique des équations différentielles qui définissent cette perturbation. L'intégration numérique couvre l'intervalle de 0 à 40. 000 jours. La comparaison montre une concordance de 1×10^{-9}.

Резюме

Излагается аналитический способ вычисления возбуждений второго порядка в прямоугольных координатах, согласно Брауэрской теории планетного движения. Одно- и двух-гармонические анализы и умножение серии Фоурьера с числовыми коэффициентами использованы в расчетах. При умножении серии была учитана переменная толеранция, позволяя избежать трудности, возникающие благодаря малому разделителю.

Также приведен пример вычисления Марсовых возбуждений второго порядка, содержащих массы Юпитера и Сатурна. Аналитическое решение этих возбуждений сравнено с числовой интеграцией дифференциальных уравнений, определяющих этих возбуждений. Числовая интеграция покрыла интервал от 0 до 40.000 дней. Сравнение показывает согласие в пределах 1×10^{-9}.

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1. INTRODUCTION

The author has successfully applied Brouwer's theory of general perturbation in rectangular coordinates to obtain a first-order planetary theory for all the principal planets except Pluto (Hamid, 1968). The advantage of Brouwer's theory over other planetary theories is its convenience when higher order perturbations are considered.

In this report, the adaptation of the theory in the computation of second-order perturbations is discussed. General computer programs have been developed for the computation of the different second-order terms of planetary perturbations. These programs have been applied for the planet Mars to compute the second-order perturbations factored by the product of the masses of Jupiter and Saturn. The numerical results obtained have been tested successfully against the numerical integration of the differential equations satisfying these perturbations.

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2. THE EQUATIONS OF MOTION

Consider a set of rectangular axes, the x axis corresponding to the direction from the sun to the perihelion of the orbit of the perturbed planet at a given epoch, and the z axis perpendicular to that orbital plane at this epoch. Then, the perturbations δx, δy, δz in the rectangular coordinates satisfy the following set of differential equations:

$$\frac{d^2\delta x}{dt^2} + \mu \frac{\delta x}{r_0^3} - \frac{3\mu x_0}{r_0^5}(x_0\,\delta x + y_0\,\delta y) = G_x \quad ,$$

$$\frac{d^2\delta y}{dt^2} + \mu \frac{\delta y}{r_0^3} - \frac{3\mu y_0}{r_0^5}(x_0\,\delta x + y_0\,\delta y) = G_y \quad ,$$

$$\frac{d^2\delta z}{dt^2} + \mu \frac{\delta z}{r_0^3} = G_z \quad . \tag{1}$$

The quantities (x_0, y_0, z_0) are the coordinates of the planet, with its unperturbed orbit assumed at epoch, while r_0 denotes the heliocentric distance of the planet.

The functions G_x, G_y, G_z can be separated into different parts of descending order of magnitude, the first part giving rise to first-order perturbations, the second part to second-order perturbations, and so on. We denote these parts by G_{1x}, G_{1y}, G_{1z}; G_{2x}, G_{2y}, G_{2z}; . . . , and let δx_1, δy_1, δz_1; δx_2, δy_2, δz_2; . . . be the corresponding perturbations in the rectangular coordinates.

The first-order perturbations δx_1, δy_1, δz_1 will satisfy equations (1) when the values of G_x, G_y, G_z are put equal to G_{1x}, G_{1y}, G_{1z}, and similarly for higher order perturbations.

We consider the second-order perturbations, which are written as

$$\frac{d^2 \delta x_2}{dt^2} + \mu \frac{\delta x_2}{r_0^3} - \frac{3\mu x_0}{r_0^5} (x_0 \delta x_2 + y_0 \delta y_2) = G_{2x} \quad ,$$

$$\frac{d^2 \delta y_2}{dt^2} + \mu \frac{\delta y_2}{r_0^3} - \frac{3\mu y_0}{r_0^5} (x_0 \delta x_2 + y_0 \delta y_2) = G_{2y} \quad ,$$

$$\frac{d^2 \delta z_2}{dt^2} + \mu \frac{\delta z_2}{r_0^3} = G_{2z} \quad . \tag{2}$$

The solution of equations (2), given by Brouwer and Clemence (1961), takes the following form:

$$\begin{aligned} \delta x_2 = {} & \frac{\partial x_0}{\partial L_0} \int \left(\frac{\partial x_0}{\partial \omega_0} G_{2x} + \frac{\partial y_0}{\partial \omega_0} G_{2y} \right) dt - \frac{\partial x_0}{\partial \omega_0} \int \left(\frac{\partial x_0}{\partial L_0} G_{2x} + \frac{\partial y_0}{\partial L_0} G_{2y} \right) dt \\ & + \frac{\partial x_0}{\partial \xi_0} \int \left(\frac{\partial x_0}{\partial \eta_0} G_{2x} + \frac{\partial y_0}{\partial \eta_0} G_{2y} \right) dt - \frac{\partial x_0}{\partial \eta_0} \int \left(\frac{\partial x_0}{\partial \xi_0} G_{2x} + \frac{\partial y_0}{\partial \xi_0} G_{2y} \right) dt \\ & - 3\mu^2 L_0^{-4} \frac{\partial x_0}{\partial \omega_0} \iint \left(\frac{\partial x_0}{\partial \omega_0} G_{2x} + \frac{\partial y_0}{\partial \omega_0} G_{2y} \right) dt^2 \quad , \end{aligned}$$

$$\begin{aligned} \delta y_2 = {} & \frac{\partial y_0}{\partial L_0} \int \left(\frac{\partial x_0}{\partial \omega_0} G_{2x} + \frac{\partial y_0}{\partial \omega_0} G_{2y} \right) dt - \frac{\partial y_0}{\partial \omega_0} \int \left(\frac{\partial x_0}{\partial L_0} G_{2x} + \frac{\partial y_0}{\partial L_0} G_{2y} \right) dt \\ & + \frac{\partial y_0}{\partial \xi_0} \int \left(\frac{\partial x_0}{\partial \eta_0} G_{2x} + \frac{\partial y_0}{\partial \eta_0} G_{2y} \right) dt - \frac{\partial y_0}{\partial \eta_0} \int \left(\frac{\partial x_0}{\partial \xi_0} G_{2x} + \frac{\partial y_0}{\partial \xi_0} G_{2y} \right) dt \\ & - 3\mu^2 L_0^{-4} \frac{\partial y_0}{\partial \omega_0} \iint \left(\frac{\partial x_0}{\partial \omega_0} G_{2x} + \frac{\partial y_0}{\partial \omega_0} G_{2y} \right) dt^2 \quad , \end{aligned}$$

$$\delta z_2 = q_2 \int q_1 G_{2z}\, dt - q_1 \int q_2 G_{2z}\, dt \quad . \tag{3}$$

For the definition of the different partial derivatives of the coordinates x_0, y_0 and of the quantities q_1, q_2, in equations (3), see Brouwer and Clemence (1961).

3. THE DEVELOPMENT OF G_{2x}, G_{2y}, G_{2z}

The expressions for G_{2x}, G_{2y}, G_{2z} have the following form:

$$G_{2x} = \frac{\partial^2 R_0}{\partial x_k^2}\,\delta x_k + \frac{\partial^2 R_0}{\partial x_k\,\partial y_k}\,\delta y_k + \frac{\partial^2 R_0}{\partial x_k\,\partial z_k}\,\delta z_k$$

$$+ \sum_{j=1}^{n}\left(\frac{\partial^2 R_0}{\partial x_k\,\partial x_j}\,\delta x_j + \frac{\partial^2 R_0}{\partial x_k\,\partial y_j}\,\delta y_j + \frac{\partial^2 R_0}{\partial x_k\,\partial z_j}\,\delta z_j\right)$$

$$+ \mu\left[\left(\frac{9}{2}\,\frac{x_k}{r_k^5} - \frac{15}{2}\,\frac{x_k^3}{r_k^7}\right)\delta x_k^2 + \left(3\,\frac{y_k}{r_k^5} - 15\,\frac{x_k^2\,y_k}{r_k^7}\right)\delta x_k\,\delta y_k\right.$$

$$\left. + \left(\frac{3}{2}\,\frac{x_k}{r_k^5} - \frac{15}{2}\,\frac{x_k\,y_k^2}{r_k^7}\right)\delta y_k^2 + \frac{3}{2}\,\frac{x_k}{r_k^5}\,\delta z_k^2\right]$$

$$G_{2y} = \frac{\partial^2 R_0}{\partial y_k\,\partial x_k}\,\delta x_k + \frac{\partial^2 R_0}{\partial y_k^2}\,\delta y_k + \frac{\partial^2 R_0}{\partial y_k\,\partial z_k}\,\delta z_k$$

$$+ \sum_{j=1}^{n}\left(\frac{\partial^2 R_0}{\partial y_k\,\partial x_j}\,\delta x_j + \frac{\partial^2 R_0}{\partial y_k\,\partial y_j}\,\delta y_j + \frac{\partial^2 R_0}{\partial y_k\,\partial z_j}\,\delta z_j\right)$$

$$+ \mu\left[\left(\frac{3}{2}\,\frac{y_k}{r_k^5} - \frac{15}{2}\,\frac{x_k^2\,y_k}{r_k^7}\right)\delta x_k^2 + \left(3\,\frac{x_k}{r_k^5} - 15\,\frac{x_k\,y_k^2}{r_k^7}\right)\delta x_k\,\delta y_k\right.$$

$$+\left(\frac{9}{2}\frac{y_k}{r_k^5}-\frac{15}{2}\frac{y_k^3}{r_k^7}\right)\delta y_k^2+\frac{3}{2}\frac{y_k}{r_k^5}\delta z_k^2\Bigg] ,$$

$$G_{2z}=\frac{\partial^2 R_0}{\partial z_k\,\partial x_k}\delta x_k+\frac{\partial^2 R_0}{\partial z_k\,\partial y_k}\delta y_k+\frac{\partial^2 R_0}{\partial z_k^2}\delta z_k$$

$$+\sum_{j=1}^{n}\left(\frac{\partial^2 R_0}{\partial z_k\,\partial x_j}\delta x_j+\frac{\partial^2 R_0}{\partial z_k\,\partial y_j}\delta y_j+\frac{\partial^2 R_0}{\partial z_k\,\partial z_j}\delta z_j\right)$$

$$+\mu\left(3\frac{x_k}{r_k^5}\delta x_k\,\delta z_k+3\frac{y_k}{r_k^5}\delta y_k\,\delta z_k\right) . \tag{4}$$

In equations (4), we have

x_j, y_j, z_j = the rectangular coordinates of the disturbing planet j, with its unperturbed orbit assumed at epoch;

x_k, y_k, z_k = the rectangular coordinates of the disturbed planet k, with its unperturbed orbit assumed at epoch. Note that $x_k = x_0$, $y_k = y_0$, $z_k = 0$;

δx_k, δy_k, δz_k = the perturbations in the rectangular coordinates of the disturbed planet k;

δx_j, δy_j, δz_j = the perturbations in the rectangular coordinates of the disturbing planet j;

$\mu = k^2(1+m_k)$, where k is the gaussian constant and m_k is the mass of the disturbed planet k;

R_0 = the well-known disturbing function of the different disturbing planets on planet k, given by

$$R_0 = k^2 \sum_{j \neq k} m_j \left(\frac{1}{\Delta_{kj}} - \frac{x_k x_j + y_k y_j + z_k z_j}{r_j^3} \right) \quad , \tag{5}$$

where Δ_{kj} is the mutual distance of planets k and j, and r_j is the heliocentric distance of planet j.

We note that $\sum_{j \neq k}$ represents the sum over all the disturbing planets j. For example, if we consider the theory of Mars, then we have k = 4, and j will take the numbers 1, 2, 3, 5, 6, 7, 8, corresponding to the effects of Mercury, Venus, Earth, Jupiter, Saturn, Uranus, and Neptune. In this report, we shall exclude the effect of Pluto.

For the perturbations δx_k, δy_k, δz_k and δx_j, δy_j, δz_j, we shall consider the values derived from the first-order theory. The δx_k, δy_k, δz_k are composed of different parts, owing to the perturbations of the different disturbing planets.

If we let $F_{1k}(jk)$, $F_{2k}(jk)$, $F_{3k}(jk)$ be, respectively, the first-order perturbations in δx_k, δy_k, δz_k due to the disturbing planet j, then,

$$\delta x_k = \sum_{j \neq k} F_{1k}(jk) \quad ,$$

$$\delta y_k = \sum_{j \neq k} F_{2k}(jk) \quad ,$$

$$\delta z_k = \sum_{j \neq k} F_{3k}(jk) \quad . \tag{6}$$

Similarly,

$$\delta x_j = \sum_{i \neq j} F_{1j}(ij) \quad ,$$

$$\delta y_j = \sum_{i \neq j} F_{2j}(ij) \quad ,$$

$$\delta z_j = \sum_{i \neq j} F_{3j}(ij) \quad . \tag{7}$$

The coefficients of δx_k, δy_k, δz_k in equations (4) can be written as follows:

$$\frac{\partial^2 R_0}{\partial x_k^2} = \sum_{j \neq k} \phi_{x1}(jk) \quad , \quad \frac{\partial^2 R_0}{\partial y_k \, \partial x_k} = \sum_{j \neq k} \phi_{y1}(jk) \quad , \quad \frac{\partial^2 R_0}{\partial z_k \, \partial x_k} = \sum_{j \neq k} \phi_{z1}(jk) \quad ,$$

$$\frac{\partial^2 R_0}{\partial x_k \, \partial y_k} = \sum_{j \neq k} \phi_{x2}(jk) \quad , \quad \frac{\partial^2 R_0}{\partial y_k^2} = \sum_{j \neq k} \phi_{y2}(jk) \quad , \quad \frac{\partial^2 R_0}{\partial z_k \, \partial y_k} = \sum_{j \neq k} \phi_{z2}(jk) \quad ,$$

$$\frac{\partial^2 R_0}{\partial x_k \, \partial z_k} = \sum_{j \neq k} \phi_{x3}(jk) \quad , \quad \frac{\partial^2 R_0}{\partial y_k \, \partial z_k} = \sum_{j \neq k} \phi_{y3}(jk) \quad , \quad \frac{\partial^2 R_0}{\partial z_k^2} = \sum_{j \neq k} \phi_{z3}(jk) \quad , \tag{8}$$

where

$$\phi_{x1}(jk) = k^2 m_j \left[- \frac{1}{\Delta_{kj}^3} + \frac{3(x_j - x_k)^2}{\Delta_{kj}^5} \right] \quad ,$$

$$\phi_{x2}(jk) = k^2 m_j \, \frac{3(x_j - x_k)(y_j - y_k)}{\Delta_{kj}^5} \quad ,$$

$$\phi_{x3}(jk) = \frac{k^2 m_j \, 3(x_j - x_k) z_j}{\Delta_{kj}^5} \quad ,$$

$$\phi_{y2}(jk) = k^2 m_j \left[- \frac{1}{\Delta_{kj}^3} + \frac{3(y_j - y_k)^2}{\Delta_{kj}^5} \right] \quad ,$$

$$\phi_{y3}(jk) = k^2 m_j \frac{3(y_j - y_k) z_j}{\Delta_{kj}^5} \quad ,$$

$$\phi_{z3}(jk) = k^2 m_j \left(- \frac{1}{\Delta_{kj}^3} + \frac{3z_j^2}{\Delta_{kj}^5} \right) \quad ,$$

$$\phi_{y1}(jk) = \phi_{x2}(jk) \quad ,$$

$$\phi_{z1}(jk) = \phi_{x3}(jk) \quad ,$$

$$\phi_{z2}(jk) = \phi_{y3}(jk) \quad . \tag{9}$$

The coefficients of δx_j, δy_j, δz_j in equations (4) can be written

$$\frac{\partial^2 R_0}{\partial x_k \partial x_j} = \theta_{x1}(jk) \quad , \qquad \frac{\partial^2 R_0}{\partial y_k \partial x_j} = \theta_{y1}(jk) \quad , \qquad \frac{\partial^2 R_0}{\partial z_k \partial x_j} = \theta_{z1}(jk) \quad ,$$

$$\frac{\partial^2 R_0}{\partial x_k \partial y_j} = \theta_{x2}(jk) \quad , \qquad \frac{\partial^2 R_0}{\partial y_k \partial y_j} = \theta_{y2}(jk) \quad , \qquad \frac{\partial^2 R_0}{\partial z_k \partial y_j} = \theta_{z2}(jk) \quad ,$$

$$\frac{\partial^2 R_0}{\partial x_k \partial z_j} = \theta_{x3}(jk) \quad , \qquad \frac{\partial^2 R_0}{\partial y_k \partial z_j} = \theta_{y3}(jk) \quad , \qquad \frac{\partial^2 R_0}{\partial z_k \partial z_j} = \theta_{z3}(jk) \quad , \tag{10}$$

where

$$\theta_{x1}(jk) = k^2 m_j \left[\left(\frac{1}{\Delta_{kj}^3} - \frac{1}{r_j^3} \right) + \frac{3x_j^2}{r_j^5} - \frac{3(x_j - x_k)^2}{\Delta_{kj}^5} \right] \quad ,$$

$$\theta_{x2}(jk) = k^2 m_j \left[- \frac{3(x_j - x_k)(y_j - y_k)}{\Delta_{kj}^5} + \frac{3x_j y_j}{r_j^5} \right] \quad ,$$

$$\theta_{x3}(jk) = k^2 m_j \left[- \frac{3(x_j - x_k)z_j}{\Delta_{kj}^5} + \frac{3x_j z_j}{r_j^5} \right] ,$$

$$\theta_{y2}(jk) = k^2 m_j \left[\left(\frac{1}{\Delta_{kj}^3} - \frac{1}{r_j^3} \right) - \frac{3(y_j - y_k)^2}{\Delta_{kj}^5} + \frac{3y_j^2}{r_j^5} \right] ,$$

$$\theta_{y3}(jk) = k^2 m_j \left[- \frac{3(y_j - y_k)z_j}{\Delta_{kj}^5} + \frac{3y_j z_j}{r_j^5} \right] ,$$

$$\theta_{z3}(jk) = k^2 m_j \left[\left(\frac{1}{\Delta_{kj}^3} - \frac{1}{r_j^3} \right) - \frac{3z_j^2}{\Delta_{kj}^5} + \frac{3z_j^2}{r_j^5} \right] ,$$

$$\theta_{y1}(jk) = \theta_{x2}(jk) ,$$

$$\theta_{z1}(jk) = \theta_{x3}(jk) ,$$

$$\theta_{z2}(jk) = \theta_{y3}(jk) . \qquad (11)$$

Finally, the coefficients of $(\delta x_k)^2$, $(\delta y_k)^2$, $(\delta z_k)^2$, $\delta x_k \delta y_k$, $\delta x_k \delta z_k$, $\delta y_k \delta z_k$ in equations (4) can be rewritten as follows:

$$\psi_{x1}(k) = \mu \left(4.5 \frac{x_k}{r_k^5} - 7.5 \frac{x_k^3}{r_k^7} \right) ,$$

$$\psi_{x2}(k) = \mu \left(3 \frac{y_k}{r_k^5} - 15 \frac{x_k^2 y_k}{r_k^7} \right) ,$$

$$\psi_{x3}(k) = \mu \left(1.5 \frac{x_k}{r_k^5} - 7.5 \frac{x_k y_k^2}{r_k^7} \right) ,$$

$$\psi_{x4}(k) = \mu \; 1.5 \frac{x_k}{r_k^5} ,$$

$$\psi_{y1}(k) = \mu \left(1.5 \frac{y_k}{r_k^5} - 7.5 \frac{x_k^2 y_k}{r_k^7} \right) ,$$

$$\psi_{y2}(k) = \mu \left(3 \frac{x_k}{r_k^5} - 15 \frac{x_k y_k^2}{r_k^7} \right) ,$$

$$\psi_{y3}(k) = \mu \left(4.5 \frac{y_k}{r_k^5} - 7.5 \frac{y_k^3}{r_k^7} \right) ,$$

$$\psi_{y4}(k) = \mu \; 1.5 \frac{y_k}{r_k^5} ,$$

$$\psi_{z1}(k) = \mu \; 3 \frac{x_k}{r_k^5} ,$$

$$\psi_{z2}(k) = \mu \; 3 \frac{y_k}{r_k^5} . \qquad (12)$$

With the above definitions of the various coefficients in equations (4), we have the following:

$$G_{2x} = \sum_{j\neq k} \phi_{x1}(jk) \sum_{j\neq k} F_{1k}(jk) + \sum_{j\neq k} \phi_{x2}(jk) \sum_{j\neq k} F_{2k}(jk)$$

$$+ \sum_{j\neq k} \phi_{x3}(jk) \sum_{j\neq k} F_{3k}(jk)$$

$$+ \sum_{j\neq k} \left[\theta_{x1}(jk) \sum_{i\neq j} F_{1j}(ij) + \theta_{x2}(jk) \sum_{i\neq j} F_{2j}(ij) + \theta_{x3}(jk) \sum_{i\neq j} F_{3j}(ij) \right]$$

$$+ \psi_{x1}(k) \left[\sum_{j\neq k} F_{1k}(jk) \right]^2 + \psi_{x2}(k) \left[\sum_{j\neq k} F_{1k}(jk) \right] \left[\sum_{j\neq k} F_{2k}(jk) \right]$$

$$+ \psi_{x3}(k) \left[\sum_{j\neq k} F_{2k}(jk) \right]^2 + \psi_{x4}(k) \left[\sum_{j\neq k} F_{3k}(jk) \right]^2 ,$$

$$G_{2y} = \sum_{j\neq k} \phi_{y1}(jk) \sum_{j\neq k} F_{1k}(jk) + \sum_{j\neq k} \phi_{y2}(jk) \sum_{j\neq k} F_{2k}(jk)$$

$$+ \sum_{j\neq k} \phi_{y3}(jk) \sum_{j\neq k} F_{3k}(jk)$$

$$+ \sum_{j\neq k} \left[\theta_{y1}(jk) \sum_{i\neq j} F_{1j}(ij) + \theta_{y2}(jk) \sum_{i\neq j} F_{2j}(ij) + \theta_{y3}(jk) \sum_{i\neq j} F_{3j}(ij) \right]$$

$$+ \psi_{y1}(k)\left[\sum_{j\neq k} F_{1k}(jk)\right]^2 + \psi_{y2}(k)\left[\sum_{j\neq k} F_{1k}(jk)\right]\left[\sum_{j\neq k} F_{2k}(jk)\right]$$

$$+ \psi_{y3}(k)\left[\sum_{j\neq k} F_{2k}(jk)\right]^2 + \psi_{y4}(k)\left[\sum_{j\neq k} F_{3k}(jk)\right]^2 ,$$

$$G_{2z} = \sum_{j\neq k} \phi_{z1}(jk) \sum_{j\neq k} F_{1k}(jk) + \sum_{j\neq k} \phi_{z2}(jk) \sum_{j\neq k} F_{2k}(jk)$$

$$+ \sum_{j\neq k} \phi_{z3}(jk) \sum_{j\neq k} F_{3k}(jk)$$

$$+ \sum_{j\neq k}\left[\theta_{z1}(jk)\sum_{i\neq j} F_{1j}(ij) + \theta_{z2}(jk)\sum_{i\neq j} F_{2j}(ij) + \theta_{z3}(jk)\sum_{i\neq j} F_{3j}(ij)\right]$$

$$+ \psi_{z1}(k)\left[\sum_{j\neq k} F_{1k}(jk)\right]\left[\sum_{j\neq k} F_{3k}(jk)\right]$$

$$+ \psi_{z2}(k)\left[\sum_{j\neq k} F_{2k}(jk)\right]\left[\sum_{j\neq k} F_{3k}(jk)\right] \qquad (13)$$

Let us now look more closely at the different terms defining the quantities G_{2x}, G_{2y}, G_{2z}. The ϕ and θ terms can be represented by double Fourier series in the mean anomalies ℓ_k, ℓ_j of the disturbed planet k and the disturbing planet j. These series can be obtained by computing the special numerical values of ϕ and θ for different combinations of equidistant values of the mean anomalies ℓ_k, ℓ_j. These special values are then subjected to double-harmonic analysis.

The ψ terms can be represented by Fourier series in one argument, the mean anomaly ℓ_k of the disturbed planet k. These series can be obtained by computing the special numerical values of ψ for different equidistant values of the mean anomaly ℓ_k and then subjecting these values to single-harmonic analysis.

In other words, by expressing the ϕ, θ, and ψ terms as Fourier series in the mean anomalies, we can avoid analytical expansions. Only double- and single-harmonic-analysis techniques can be applied. This is what we have done in the present work. In fact, a general computer program can be constructed to have as output the Fourier representations of the different ϕ, θ, and ψ terms for any given values of j, k.

The terms $F_{1k}(jk)$, $F_{2k}(jk)$, $F_{3k}(jk)$ have already been obtained in the first-order theory. It should be remembered that these perturbations in rectangular coordinates are composed of two parts: the periodic and the secular. The periodic part is represented as double Fourier series in the mean anomalies ℓ_j, ℓ_k, and the secular part by the product of the time t (measured from the given epoch) and a single Fourier series in the mean anomaly ℓ_k. Let the periodic part be denoted by $f_{1k}(jk)$, $f_{2k}(jk)$, $f_{3k}(jk)$, and the secular part, by $t\,S_{1jk}(k)$, $t\,S_{2jk}(k)$, $t\,S_{3jk}(k)$. Hence,

$$F_{ik}(jk) = f_{ik}(jk) + t\,S_{ijk}(k) \quad , \tag{14}$$

where $i = 1, 2, 3$.

Let us consider the part $\sum_{j \neq k} \phi_{x1}(jk)$. From the above remarks, this part is represented by the summation of different Fourier series, and each series is represented in the mean anomalies ℓ_j and ℓ_k. For example, if we are considering the theory of Mars, we have $k = 4$, and $\sum_{j \neq k} \phi_{x1}(jk)$ will be composed of the sum of seven Fourier series: the first series in ℓ_1, ℓ_4, the mean anomalies of Mercury and Mars; the second series in ℓ_2, ℓ_4, the mean anomalies of Venus and Mars; and so on. Similarly, the part $\sum_{j \neq k} F_{1k}(jk)$ is composed of the sum of different Fourier series, and each series is expanded in the mean anomalies ℓ_j, ℓ_k. In addition to these Fourier series, this part contains a term t multiplied by a Fourier series in single argument ℓ_k, the mean anomaly of the disturbed planet. In fact, for i = 1, 2, 3,

$$\sum_{j\neq k} F_{ik}(jk) = \sum_{j\neq k} f_{ik}(jk) + t\, S_{ik}(k) \quad , \tag{15}$$

where

$$S_{ik}(k) = \sum_{j\neq k} S_{ijk}(k) \quad .$$

We note that t $S_{1k}(k)$, t $S_{2k}(k)$, t $S_{3k}(k)$ are the total secular perturbations in rectangular coordinates of all the disturbing planets on planet k.

Similar considerations apply for the different parts of equations (13). Hence, G_{2x}, G_{2y}, G_{2z} can be represented by the following equations:

$$G_{2x} = G_{2xktt}(k) \cdot t^2 + \sum_{j\neq k} [G_{2xjkt}(jk) \cdot t + G_{2xjk}(jk)]$$

$$+ \sum_{j} \sum_{m} G_{2xmjk}(mjk) \quad ,$$

$$G_{2y} = G_{2yktt}(k) \cdot t^2 + \sum_{j\neq k} [G_{2yjkt}(jk) \cdot t + G_{2yjk}(jk)]$$

$$+ \sum_{j} \sum_{m} G_{2ymjk}(mjk) \quad ,$$

$$G_{2z} = G_{2zktt}(k) \cdot t^2 + \sum_{j \neq k} [G_{2zjkt}(jk) \cdot t + G_{2zjk}(jk)]$$

$$+ \sum_j \sum_m G_{2zmjk}(mjk) \quad , \tag{16}$$

where G(k), G(jk), and G(mjk), appearing on the right-hand side of equations (16), denote, respectively, Fourier series in one argument, the mean anomaly ℓ_k; in two arguments, the mean anomalies ℓ_j, ℓ_k; and in three arguments, the mean anomalies ℓ_m, ℓ_j, ℓ_k. The double summation $\sum_j \sum_m$ means that m and j take the values corresponding to all the disturbing planets, excluding m = j and avoiding double counting.

Following are the expressions for the different G(mjk) in equations (16):

$$G_{2qmjk}(mjk) = \sum_{i=1}^{3} [\phi_{qi}(jk)\ f_{ik}(mk) + \phi_{qi}(mk)\ f_{ik}(jk) + \theta_{qi}(jk)\ f_{ij}(mj)$$

$$+ \theta_{qi}(mk)\ f_{im}(jm)] + 2\psi_{q1}(k)\ f_{1k}(jk)\ f_{1k}(mk)$$

$$+ \psi_{q2}(k)[f_{1k}(jk)\ f_{2k}(mk) + f_{1k}(mk)\ f_{2k}(jk)]$$

$$+ 2\psi_{q3}(k)\ f_{2k}(jk)\ f_{2k}(mk) + 2\psi_{q4}(k)\ f_{3k}(jk)\ f_{3k}(mk) \quad ,$$

where q = x, y, and

$$G_{2zmjk}(mjk) = \sum_{i=1}^{3} [\phi_{zi}(jk)\ f_{ik}(mk) + \phi_{zi}(mk)\ f_{ik}(jk)$$

$$+ \theta_{zi}(jk)\ f_{ij}(mj) + \theta_{zi}(mk)\ f_{im}(jm)]$$

$$+ \psi_{z1}(k)[f_{1k}(jk)\, f_{3k}(mk) + f_{1k}(mk)\, f_{3k}(jk)]$$

$$+ \psi_{z2}(k)[f_{2k}(jk)\, f_{3k}(mk) + f_{2k}(mk)\, f_{3k}(jk)] \quad . \qquad (17)$$

The terms G(jk) (not multiplied by t) in equations (16) are expressed as follows:

$$G_{2qjk}(jk) = \sum_{i=1}^{3} [\phi_{qi}(jk)\, f_{ik}(jk) + \theta_{qi}(jk)\, f_{ij}(kj)] + \psi_{q1}(k)\, f_{1k}^2(jk)$$

$$+ \psi_{q2}(k)\, f_{1k}(jk)\, f_{2k}(jk) + \psi_{q3}(k)\, f_{2k}^2(jk) + \psi_{q4}(k)\, f_{3k}^2(jk) \quad ,$$

where q = x, y, and

$$G_{2zjk}(jk) = \sum_{i=1}^{3} [\phi_{zi}(jk)\, f_{ik}(jk) + \theta_{zi}(jk)\, f_{ij}(kj)] + \psi_{z1k} f_{1k}(jk)\, f_{3k}(jk)$$

$$+ \psi_{z2}(k)\, f_{2k}(jk)\, f_{3k}(jk) \quad . \qquad (18)$$

The terms G(jk) (multiplied by t) take the following forms:

$$G_{2qjkt}(jk) = \sum_{i=1}^{3} [\phi_{qi}(jk)\, S_{ik}(k) + \theta_{qi}(jk)\, S_{ij}(j)] + 2\psi_{q1}(k)\, f_{1k}(jk)\, S_{1k}(k)$$

$$+ \psi_{q2}(k)[f_{1k}(jk)\, S_{2k}(k) + f_{2k}(jk)\, S_{1k}(k)]$$

$$+ 2\psi_{q3}(k)\, f_{2k}(jk)\, S_{2k}(k) + 2\psi_{q4}(k)\, f_{3k}(jk)\, S_{3k}(k) \quad ,$$

where q = x, y, and

$$G_{2zjkt}(jk) = \sum_{i=1}^{3} [\phi_{zi}(jk)\ S_{ik}(k) + \theta_{zi}(jk)\ S_{ij}(j)]$$

$$+ \psi_{z1}(k)[f_{1k}(jk)\ S_{3k}(k) + f_{3k}(jk)\ S_{1k}(k)]$$

$$+ \psi_{z2}(k)[f_{2k}(jk)\ S_{3k}(k) + f_{3k}(jk)\ S_{2k}(k)] \tag{19}$$

For the terms with coefficient t^2 in equations (16), we have

$$G_{2qktt}(k) = \psi_{q1}(k)\ S^2_{1k}(k) + \psi_{q2}(k)\ S_{1k}(k)\ S_{2k}(k)$$

$$+ \psi_{q3}(k)\ S^2_{2k}(k) + \psi_{q4}(k)\ S^2_{3k}(k) \quad ,$$

where q = x, y, and

$$G_{2zktt}(k) = \psi_{z1}(k)\ S_{1k}(k)\ S_{3k}(k) + \psi_{z2}(k)\ S_{2k}(k)\ S_{3k}(k) \quad . \tag{20}$$

In equations (17) to (20), all the different terms on the right-hand side are expressed in Fourier series in the mean anomalies ℓ_m, ℓ_j, ℓ_k. We have already outlined how we obtain these series. We are now in a position to evaluate the Fourier representations in mean anomalies of the functions $G_{2qmjk}(mjk)$, $G_{2qjk}(jk)$, G_{2qjkt}, G_{2qktt}, where q denotes the parameters x, y, and z.

Let us consider, for example, $G_{2qmjk}(mjk)$, whose expressions are given in equations (17). Since we have the Fourier series for all the terms appearing in the right-hand side of equations (17), we can, by the technique of multiplying Fourier series, obtain the Fourier series representing $G_{2qmjk}(mjk)$. In this case, we did not resort to triple-harmonic analysis because it would have been excessively laborious. In fact, we constructed a general computer program that has as input the numerical values of m, j, and k and that will give as output the Fourier representations of $G_{2qmjk}(mjk)$ in the mean anomalies ℓ_m, ℓ_j, ℓ_k (q denotes the values x, y, and z).

In computing the Fourier representations of $G_{2qjkt}(jk)$ and $G_{2qjk}(jk)$ for q = x, y, z, we can use the double-harmonic-analysis approach or the multiplication-of-series approach. To compute the Fourier representations of $G_{2qktr}(k)$ for q = x, y, z, we can very conveniently use the single-harmonic-analysis technique.

In our work, we have a general program that, for given j, k as input, produces as intermediate output the Fourier representations of $G_{2qjkt}(jk)$, $G_{2qjk}(jk)$, and $G_{2qktt}(k)$ for q = x, y, z.

4. THE DECOMPOSITION OF δx_2, δy_2, δz_2

In the previous section, we developed the different components of the functions G_{2x}, G_{2y}, G_{2j}. We found that these functions are generally composed of the summation of the following series:

A. Fourier series in three arguments.
B. Fourier series in two arguments.
C. Fourier series in two arguments, multiplied by the time t.
D. Fourier series in one argument, multiplied by t^2.

By substituting the general expressions of G_{2x}, G_{2y}, G_{2z} in equations (3), we can see that δ_{x2}, δ_{y2}, δ_{z2} will be composed of the following different parts, where q takes the values x, y, z:

A. Fourier series in three argument (ℓ_m, ℓ_j, ℓ_k), denoted by $\delta q_{2mjk}(mjk)$.
B. Fourier series in two arguments (ℓ_j, ℓ_k), denoted by $\delta q_{2jk}(jk)$.
C. Fourier series in two arguments (ℓ_j, ℓ_k) multiplied by the time t, denoted by $\delta q_{2jkt}(jk)$.
D. Fourier series in one argument (ℓ_k) denoted by $\delta q_{2k}(k)$.
E. Fourier series in one argument (ℓ_k) multiplied by t, denoted by δq_{2kt} (k).
F. Fourier series in one argument (ℓ_k) multiplied by t^2, denoted by δq_{2ktt} (k).
G. Fourier series in one argument (ℓ_k) multiplied by t^3, denoted by δq_{2kttt} (k).
H. Fourier series in one argument (ℓ_k) multiplied by t^4, denoted by δq_{2ktttt} (k).

We must remember that ℓ_k is the mean anomaly of the disturbed planet, and ℓ_m, ℓ_j are the mean anomalies of the disturbing planets m, j.

In order to present more conveniently the equations defining the various parts of δx_2, δy_2, δz_2, let us put

$$\sum_{\alpha,\beta} \frac{\partial q}{\partial \alpha} \int \left(\frac{\partial x_0}{\partial \beta} G_{2x} + \frac{\partial y_0}{\partial \beta} G_{2y} \right) dt$$

$$= \frac{\partial q}{\partial L_0} \int \left(\frac{\partial x_0}{\partial \omega_0} G_{2x} + \frac{\partial y_0}{\partial \omega_0} G_{2y} \right) dt - \frac{\partial q}{\partial \omega_0} \int \left(\frac{\partial x_0}{\partial L_0} G_{2x} + \frac{\partial y_0}{\partial L_0} G_{2y} \right) dt$$

$$+ \frac{\partial q}{\partial \xi_0} \int \left(\frac{\partial x_0}{\partial \eta_0} G_{2x} + \frac{\partial y_0}{\partial \eta_0} G_{2y} \right) dt$$

$$- \frac{\partial q}{\partial \eta_0} \int \left(\frac{\partial x_0}{\partial \xi_0} G_{2x} + \frac{\partial y_0}{\partial \xi_0} G_{2y} \right) dt \quad , \tag{21}$$

for q = x, y. With this abbreviated notation, we have

$$\delta q_{2mjk}(mjk) = \sum_{\alpha,\beta} \frac{\partial q}{\partial \alpha} \int \left[\frac{\partial x_0}{\partial \beta} G_{2xmjk}(mjk) + \frac{\partial y_0}{\partial \beta} G_{2ymjk}(mjk) \right] dt$$

$$- 3 \mu^2 L_0^{-4} \frac{\partial q}{\partial \omega_0} \iint \left[\frac{\partial x_0}{\partial \omega_0} G_{2xmjk}(mjk) + \frac{\partial y_0}{\partial \omega_0} G_{2ymjk}(mjk) \right] dt^2 \, ,$$

where q = x, y, and

$$\delta z_{2mjk}(mjk) = q_2 \int q_1 G_{2zmjk}(mjk)\, dt - q_1 \int q_2 G_{2zmjk}(mjk)\, dt \quad . \tag{22}$$

The integrands on the right side of equations (22) can now be developed in Fourier series. Integrating these Fourier representations, we obtain other Fourier representations of the integrals. Multiplying these Fourier representations by the Fourier series representing the coefficients $\partial q/\partial a$, $-3\mu^2 L_0^{-4}(\partial q/\partial \omega_0)$, q_2, $-q_1$, and adding the different results, we obtain the Fourier representation $\delta x_{2mjk}(mjk)$, $\delta y_{2mjk}(mjk)$, $\delta z_{2mjk}(mjk)$. We note that the constant coefficient in the Fourier series representing these different integrands, i. e., the coefficients of the argument 0, will, when integrated once, give rise to a numerical coefficient multiplied by t; when integrated twice, it will give rise to a numerical coefficient multiplied by t^2. Hence, the final representations of $\delta q_{2mjk}(mjk)$ will contain, besides the purely periodic terms given by the Fourier representations in three arguments, mixed terms composed of the time t multiplied by Fourier series in one argument and, in the case of q = x, y only, the square of the time (t^2) multiplied by Fourier series in one argument. These mixed terms will be added to the perturbations $\delta q_{2kt}(k)$, $\delta q_{2ktt}(k)$.

A computer program has been constructed with the series $G_{2xmjk}(mjk)$, $G_{2ymjk}(mjk)$, $G_{2zmjk}(mjk)$ as input and, as output, Fourier representations $\delta x_{2mjk}(mjk)$, $\delta y_{2mjk}(mjk)$, $\delta z_{2mjk}(mjk)$ and the corresponding mixed terms in $\delta x_{2kt}(k)$, $\delta y_{2kt}(k)$, $\delta z_{2kt}(k)$, $\delta x_{2ktt}(k)$, $\delta y_{2ktt}(k)$.

For the evaluation of $\delta q_{2jk}(jk)$, $\delta q_{2jkt}(jk)$, for q = x, y, z, we must recall the following relations:

$$\int t\, f\, dt = t\int f\, dt - \iint f\, dt^2 \quad ,$$

$$\iint t\, f\, dt^2 = t\iint f\, dt^2 - 2\iiint f\, dt^3 \quad , \qquad (23)$$

where f is any function of time t. The equations defining $\delta q_{2jk}(jk)$ will be given by

$$\delta q_{2jk}(jk) = \sum_{\alpha,\beta} \frac{\partial q}{\partial \alpha} \int \left[\frac{\partial x_0}{\partial \beta} G_{2xjk}(jk) + \frac{\partial y_0}{\partial \beta} G_{2yjk}(jk) \right] dt$$

$$- 3\,\mu^2 L_0^{-4} \frac{\partial q}{\partial \omega_0} \iint \left[\frac{\partial x_0}{\partial \omega_0} G_{2xjk}(jk) + \frac{\partial y_0}{\partial \omega_0} G_{2yjk}(jk) \right] dt^2$$

$$- \sum_{\alpha,\beta} \frac{\partial q}{\partial \alpha} \iint \left[\frac{\partial x_0}{\partial \beta} G_{2xjkt}(jk) + \frac{\partial y_0}{\partial \beta} G_{2yjkt}(jk) \right] dt^2$$

$$+ 2 \left(3\,\mu^2 L_0^{-4} \frac{\partial q}{\partial \omega_0} \right) \iiint \left[\frac{\partial x_0}{\partial \omega_0} G_{2xjkt}(jk) + \frac{\partial y_0}{\partial \omega_0} G_{2yjkt}(jk) \right] dt^3 ,$$

where $q = x, y$, and

$$\delta z_{2jk}(jk) = q_2 \int q_1 G_{2zjk}(jk)\, dt - q_1 \int q_2 G_{2zjk}(jk)\, dt$$
$$- q_2 \iint q_1 G_{2zjkt}(jk)\, dt^2 + q_1 \iint q_2 G_{2zjkt}(jk)\, dt^2 . \tag{24}$$

Through the multiplication-of-series approach or the double-harmonic-analysis technique, we can develop the Fourier representations of all the integrands appearing in the above equations and then evaluate the Fourier representations of $\delta q_{2jk}(jk)$ for $q = x, y, z$. We note again that the constant terms in the various harmonic representations of the above integrands will give rise to mixed terms with coefficients t and t^2 in the expressions for $\delta q_{2jk}(jk)$, for $q = x, y, z$. Mixed terms with coefficient t^3 will also appear in the cases for $q = x, y$ because of the presence of triple integrals. These various mixed terms appearing in $\delta q_{2jk}(jk)$ will be included in the perturbations $\delta q_{2kt}(k)$, $\delta q_{2ktt}(k)$, and $\delta q_{2kttt}(k)$ for $q = x, y, z$.

The equations defining $\delta q_{2jkt}(jk)$ will be given by

$$\delta q_{2jkt}(jk) = \sum_{\alpha,\beta} \frac{\partial q}{\partial \alpha} \int \left[\frac{\partial x_0}{\partial \beta} G_{2xjkt}(jk) + \frac{\partial y_0}{\partial \beta} G_{2yjkt}(jk) \right] dt$$

$$- 3 \mu^2 L_0^{-4} \frac{\partial q}{\partial \omega_0} \iint \left[\frac{\partial x_0}{\partial \omega_0} G_{2xjkt}(jk) + \frac{\partial y_0}{\partial \omega_0} G_{2yjkt}(jk) \right] dt^2 ,$$

where $q = x, y$, and

$$\delta z_{2jkt}(jk) = q_2 \int q_1 G_{2zjkt}(jk) \, dt - q_1 \int q_2 G_{2zjkt}(jk) \, dt \quad . \tag{25}$$

Again, through the double-harmonic-analysis technique or the multiplication-of-series approach, we can get the harmonic representations of $\delta q_{2jkt}(jk)$ for $q = x, y, z$. Also, we expect mixed terms with coefficient t in $\delta q_{2jkt}(jk)$ for $q = x, y, z$ and with coefficient t^2 in the case of $q = x, y$. Since $\delta q_{2jkt}(jk)$ is already multiplied by t, these mixed terms will have coefficients t^2 and t^3. As before, these mixed terms will be included in the perturbations $\delta q_{2ktt}(k)$, $\delta q_{2kttt}(k)$.

Finally, for the evaluation of $\delta q_{2kt}(k)$, $\delta q_{2ktt}(k)$, $\delta q_{2kttt}(k)$ for $q = x, y, z$ and $\delta q_{2ktttt}(k)$ for $q = x, y$, we must recall the following relations:

$$\int t^2 f \, dt = t^2 \int f \, dt - 2t \iint f \, dt^2 + 2 \iiint f \, dt^3 ,$$

$$\iint t^2 f \, dt = t^2 \iint f \, dt^2 - 4t \iiint f \, dt^3 + 6 \iiiint f \, dt^4 , \tag{26}$$

where f is any function of time t.

We mentioned earlier the contributions to $\delta q_{2kt}(k)$, $\delta q_{2ktt}(k)$, $\delta q_{2kttt}(k)$ obtained while we were deriving expressions for $\delta q_{2mjk}(mjk)$, $\delta q_{2jk}(jk)$, $\delta q_{2jkt}(jk)$. In addition to these contributions, we have the following:

$$\delta q_{2kt}(k) = -2 \sum_{\alpha,\beta} \frac{\partial q}{\partial \alpha} \iint \left[\frac{\partial x_0}{\partial \beta} G_{2xktt}(k) + \frac{\partial y_0}{\partial \beta} G_{2yktt}(k) \right] dt^2$$

$$+ 4 \left(3 \mu^2 L_0^{-4} \frac{\partial q}{\partial \omega_0} \right) \iiint \left[\frac{\partial x_0}{\partial \omega_0} G_{2xktt}(k) + \frac{\partial y_0}{\partial \omega_0} G_{2yktt} \right] dt^3 ,$$

where $q = x,\ y$;

$$\delta z_{2kt}(k) = -2 q_2 \iint q_1 G_{2zktt}(k)\, dt^2 + 2 q_1 \iint q_2 G_{2zktt}(k)\, dt^2 , \qquad (27)$$

$$\delta q_{2ktt}(k) = \sum_{\alpha,\beta} \frac{\partial q}{\partial \alpha} \int \left[\frac{\partial x_0}{\partial \beta} G_{2xktt}(k) + \frac{\partial y_0}{\partial \beta} G_{2yktt}(k) \right] dt$$

$$- 3 \mu^2 L_0^{-4} \frac{\partial q}{\partial \omega_0} \iint \left[\frac{\partial x_0}{\partial \omega_0} G_{2xktt}(k) + \frac{\partial y_0}{\partial \omega_0} G_{2yktt}(k) \right] dt^2 ,$$

where $q = x, y$; and

$$\delta z_{2ktt}(k) = q_2 \int q_1 G_{2zktt}(k)\, dt - q_1 \int q_2 G_{2zktt}(k)\, dt . \qquad (28)$$

We note that mixed terms with coefficients t^3 and t^4 will appear from the expressions of $\delta q_{2kt}(k)$, $\delta q_{2ktt}(k)$ given in equations (27) and (28). These terms can be added to those defining $\delta q_{2kttt}(k)$, $\delta q_{2ktttt}(k)$. Terms that are purely periodic and are expressed in Fourier series in one argument ℓ_k will appear and are given by $\delta q_{2k}(k)$, where

$$\delta q_{2k}(k) = 2 \sum \frac{\partial q}{\partial \alpha} \iiint \left[\frac{\partial x_0}{\partial \beta} G_{2xktt}(k) + \frac{\partial y_0}{\partial \beta} G_{2yktt}(k) \right] dt^3$$

$$- 6 \left(3 \mu^2 L_0^{-4} \frac{\partial q}{\partial \omega_0} \right) \iiiint \left[\frac{\partial x_0}{\partial \omega_0} G_{2xktt}(k) + \frac{\partial y_0}{\partial \omega_0} G_{2yktt}(k) \right] dt^4 ,$$

for $q = x, y$, and

$$\delta z_{2k}(k) = 2 q_2 \iiint q_1 G_{2zktt}(k) dt^3 - 2 q_1 \iiint q_2 G_{2zktt}(k) dt^3 . \qquad (29)$$

Again, the terms may give rise to mixed terms with coefficients t^3 and t^4. These will be added to $\delta q_{2kttt}(k)$ for $q = x, y, z$ and to $\delta q_{2ktttt}(k)$ for $q = x, y$.

A computer program THEORY 2 has been constructed to compute $\delta q_{2jk}(jk)$, $\delta q_{2jkt}(jk)$, $\delta q_{2k}(k)$, $\delta q_{2kt}(k)$, . . . , $\delta q_{2ktttt}(k)$. The input of this program is j, k. The final output is the Fourier representations of these perturbations. In this program, we followed the double- and single-harmonic-analysis methods; we did not apply the multiplication-of-series technique.

5. NUMERICAL APPLICATION

In the previous section, we outlined the method followed for computing the second-order perturbations in δx, δy, and δz. We have two main computer programs. By use of the harmonic-analysis approach, program THEORY 2 computes the periodic and secular perturbations expressed in Fourier series in the two mean anomalies ℓ_j, ℓ_k of the disturbing and the disturbed planets and also in one mean anomaly ℓ_k of the disturbed planet.

The second main program computes the periodic perturbations expressed in Fourier series in the three mean anomalies: ℓ_m, ℓ_j, the mean anomalies of the disturbing planets, and ℓ_k, the mean anomaly of the disturbed planet.

We used the multiplication-of-series approach, which required carrying the multiplication to a certain tolerance. This tolerance is taken to be directly proportional to the divisor when we compute the integrand that will be integrated once. For the case of the integrand that will be integrated twice, we take the tolerance to be directly proportional to the square of the divisor (the constant of proportionality is 10^{-13}). This variable tolerance device will assure us that there has been no loss of any significant digits owing to the small divisor.

The author will soon publish the details of these two main programs and the different subroutines associated with them.

6. NUMERICAL RESULTS

In this section, we present the results of the computation of the second-order perturbation of Mars containing the masses of Jupiter and Saturn; according to the notation given previously, we give the results of δq_{2mjk} ($q = x, y, z$), where $m = 6$, $j = 5$, and $k = 4$. The other results will be given in another paper.

Tables 1, 2, and 3 give the periodic part of the Fourier series representation of δx_{2mjk}, δy_{2mjk}, and δz_{2mjk}. The mixed terms arising from the evaluation of these perturbations are given in Tables 4, 5, and 6. The coefficients in these mixed terms are computed up to a tolerance of 10^{-19}. As a check, it would be interesting to compare the series we obtained for these perturbations with the results obtained from numerical integration.

The above series representations (periodic and mixed) are simply the analytical solution of the set of differential equations (2), where G_{2x}, G_{2y}, and G_{2z} are replaced by G_{2xmjk}, G_{2ymjk}, and G_{2zmjk}. That set of differential equations has been solved numerically, using Cowell's method of numerical integration. In applying this method, the tenth difference has been neglected and the interval of integrations is taken to be 10 days. The initial values of the numerical integration are chosen such that δx, δy, δz at $t = 90$ days and $t = 100$ days are given by the analytical solutions of δx, δy, δz.

The evaluation of G_{2xmjk}, G_{2ymjk}, G_{2zmjk} in the numerical integration of the differential equation was carried out by use of the original definition of these G's as given by equations (17). The integration has been carried out up to $t = 40,000$ days.

When we compare the results of the numerical integration with the analytical representation, deviation is found between the two. The deviations found in the comparison of the perturbations in x and y are periodic in character, with the amplitude increasing with time. The amplitude reaches 5×10^{-7} around t = 20,000. The deviation found in the comparison of the perturbation in z is again periodic, with smaller amplitude. The amplitude reaches 1×10^{-9}. The disagreement between the numerical solution and the analytical representation of the perturbation in x, y is very alarming.

However, we must expect a satisfactory agreement if the starting values used in initiating the numerical integration are given to a great accuracy. These starting values have been obtained, as mentioned earlier, from the analytical solution. In obtaining the analytical solution, we carried the evaluation of the different integrals involved up to a tolerance of 10^{-13}; i.e., terms with absolute values less than 10^{-13} have been neglected. These terms may add up, causing the accuracy of the evaluation of the integral to be more than 10^{-13}. We must remember, also, that these integrals must be multiplied by the partial derivatives $\partial x_0/\partial \omega_0$, $\partial y_0/\partial \omega_0$, $\partial x_0/\partial L_0$, $\partial y_0/\partial L_0$, ... The coefficients of the harmonic representation of these partial derivatives amount to 10^2. Thus, the accuracy of the evaluation of the periodic representation of the perturbation in x, y, and z may amount to 10^{-11} or even 10^{-10}.

Numerical integration of the differential equations defining the second-order perturbation is very sensitive to the starting values, which we have just found may be in error to within 10^{-10} to 10^{-11}. To meet that situation,* we can apply differential corrections to the starting values, such that the deviation between the numerical integration and the analytical solution is minimum, in the least-squares sense.

*The author owes this idea to Prof. G. M. Clemence.

We have applied differential corrections where our equation of condition corresponded to deviations at $t = 200, 1800, 3400, \ldots, 19,400$ days. The results of this follow:

At $t = 90$ days,

$$\Delta(\delta x) = -8.6198240974 \times 10^{-11}$$

$$\Delta(\delta y) = -1.3774726475 \times 10^{-10}$$

$$\Delta(\delta z) = +3.2748239038 \times 10^{-10} \quad .$$

At $t = 100$ days,

$$\Delta(\delta x) = -3.6212757640 \times 10^{-11}$$

$$\Delta(\delta y) = -2.4084833490 \times 10^{-10}$$

$$\Delta(\delta z) = +3.5234609123 \times 10^{-10} \quad .$$

When we apply these corrections to the starting values of the numerical integration, the agreement between the analytical solution and the numerical integration improves appreciably. The deviation, after the integration is carried to 40,000 days, never exceeds 4×10^{-10} in x, y and 1×10^{-9} in z, an excellent agreement indeed. This comparison is shown in Table 7.

Table 1. Fourier representation of δx_{2mjk} (periodic part). The coefficients are in units of 10^{-13}

6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin
0	0	0	1083	0	3	-7	1	9629	-25492	5	10	-9	-33	25	10	-7	3	1228	683
0	0	1	-4250	72	3	-7	2	-54563	18508	5	10	-8	-12	9	10	-7	4	121	131
0	0	2	-594	0	3	-7	3	-4969	13468	5	10	-7	-9	3	10	-7	5	-3	17
0	0	3	-62	-5	3	-7	4	-353	4738	5	10	-6	-4	-11	10	-7	6	-10	9
0	0	4	-15	-0	3	-7	5	-430	19	5	10	-5	-1	-1	10	-7	7	-2	2
0	0	5	3	1	3	-7	6	-173	-185	5	11	-15	3	0	10	-6	-4	-2	4
0	0	6	2	-0	3	-7	7	-32	-32	5	11	-14	9	6	10	-6	-3	3	7
0	1	-9	6	-6	3	-7	8	15	6	5	11	-13	7	10	10	-6	-2	24	-46
0	1	-8	7	-8	3	-7	9	-19	-21	5	11	-12	-17	-8	10	-6	-1	407	-418
0	1	-7	-35	34	3	-7	10	-4	-4	5	11	-11	-5	-15	10	-6	0	7219	-7464
0	1	-6	-111	119	3	-6	-4	9	-2	5	11	-10	9	-11	10	-6	1	3101	-4965
0	1	-5	-316	446	3	-6	-3	85	-20	5	11	-9	8	6	10	-6	2	-3208	3247
0	1	-4	-2580	3498	3	-6	-2	791	-176	5	11	-8	-1	3	10	-6	3	-1015	1345
0	1	-3	-16560	22995	3	-6	-1	7946	-1741	5	11	7	-6	-20	10	-6	4	-149	204
0	1	-2	-57024	84409	3	-6	0	97084	-21127	5	11	8	22	-13	10	-6	5	-20	43
0	1	-1	36952	-55096	3	-6	1	66106	-46259	5	11	9	11	1	10	-6	6	-2	6
0	1	0	148599	-220970	3	-6	2	-42090	20991	5	11	10	13	-15	10	-5	-5	-2	4
0	1	1	20255	-22477	3	-6	3	-10423	21752	5	11	11	15	10	10	-5	-4	-12	-0
0	1	2	1898	-1820	3	-6	4	-6411	1214	5	12	-14	4	2	10	-5	-3	-37	44
0	1	3	227	-215	3	-6	5	-2194	-492	5	12	-13	-1	4	10	-5	-2	-230	442
0	1	4	40	-43	3	-6	6	-407	-108	5	12	-12	-8	-3	10	-5	-1	-2172	3982
0	1	5	4	8	3	-6	7	-68	-45	5	12	-11	0	-5	10	-5	0	400	4865
0	1	6	1	1	3	-6	8	-9	-2	5	12	-10	5	0	10	-5	1	2582	-4306
0	2	-10	-2	3	3	-6	9	-1	-1	5	12	-9	1	1	10	-5	2	121	-2324
0	2	-9	-3	-0	3	-6	11	-1	-0	5	12	-8	-1	1	10	-5	3	-10	-279
0	2	-8	-17	-46	3	-5	-5	2	-0	6	-15	-1	-1	-1	10	-5	4	1	-37
0	2	-7	74	-29	3	-5	-4	24	-9	6	-15	0	-11	-6	10	-5	5	-0	-7
0	2	-6	-21	-25	3	-5	-3	241	-48	6	-15	1	-118	-60	10	-4	-6	1	3
0	2	-5	124	26	3	-5	-2	2211	-413	6	-15	3	118	60	10	-4	-5	9	22
0	2	-4	-439	-216	3	-5	-1	22708	-4298	6	-15	4	11	6	10	-4	-4	36	196
0	2	-3	-4371	-7328	3	-5	0	295471	-51998	6	-15	5	1	1	10	-4	-3	286	1536
0	2	-2	-2362	-27522	3	-5	1	283632	-71833	6	-14	2	0	1	10	-4	-2	1856	10678
0	2	-1	4872	23881	3	-5	2	-87364	13848	6	-14	4	-0	-1	10	-4	-1	-6539	-12042
0	2	0	11738	43557	3	-5	3	-86367	19581	6	-14	5	1	1	10	-4	0	-8415	-36594
0	2	1	1200	5853	3	-5	4	-23201	4971	6	-14	6	-2	1	10	-4	1	6092	10279
0	2	2	101	558	3	-5	5	-3732	846	6	-14	7	-1	-1	10	-4	2	919	1363
0	2	3	13	106	3	-5	6	-495	123	6	-14	8	2	-1	10	-4	3	107	149
0	2	4	-6	46	3	-5	7	-42	-3	6	-13	3	4	-2	10	-4	4	8	14
0	2	5	-0	-7	3	-5	8	-20	9	6	-13	4	7	5	10	-3	-6	-1	-2
0	2	6	0	1	3	-5	9	-3	1	6	-13	5	-6	-2	10	-3	-5	8	2
0	3	-7	5	2	3	-4	-6	-1	0	6	-13	6	-10	-4	10	-3	-4	43	45
0	3	-6	-7	-28	3	-4	-5	6	-9	6	-13	7	2	-1	10	-3	-3	279	55
0	3	-5	2	-8	3	-4	-4	32	-52	6	-13	8	7	4	10	-3	-2	1974	191
0	3	-4	165	-77	3	-4	-3	304	-451	6	-13	9	-2	3	10	-3	-1	25	-569
0	3	-3	2033	854	3	-4	-2	2791	-4171	6	-12	0	2	3	10	-3	0	-5110	-738
0	3	-2	5154	2865	3	-4	-1	29703	-42993	6	-12	1	-8	-6	10	-3	1	-363	373
0	3	-1	-7583	-3962	3	-4	0	413969	-492148	6	-12	2	-18	-4	10	-3	2	-28	41
0	3	0	-7025	-124	3	-4	1	493960	-558567	6	-12	3	17	20	10	-3	3	-5	1
0	3	1	-554	155	3	-4	2	-205729	240869	6	-12	4	12	11	10	-3	4	-1	-3
0	3	2	-80	3	3	-4	3	-129329	150349	6	-12	5	12	0	10	-3	5	-0	-2
0	3	3	-2	-4	3	-4	4	-19555	23284	6	-12	6	-3	8	10	-2	-10	0	-2
0	3	4	-5	16	3	-4	5	-2532	3063	6	-12	7	-6	2	10	-2	-9	3	-2
0	3	5	3	-5	3	-4	6	-313	396	6	-12	8	0	-5	10	-2	-8	4	-35
0	3	6	3	-6	3	-4	7	-17	26	6	-12	9	-5	-0	10	-2	-7	-24	17
0	4	-8	-3	-3	3	-4	8	-4	8	6	-11	-1	-1	1	10	-2	-6	-0	-20
0	4	-7	-18	-16	3	-3	-7	2	1	6	-11	0	-9	2	10	-2	-5	31	117
0	4	-6	10	5	3	-3	-6	10	3	6	-11	1	-3	-46	10	-2	-4	-462	442
0	4	-5	36	45	3	-3	-5	30	-11	6	-11	2	-31	20	10	-2	-3	-2742	-1310
0	4	-4	137	50	3	-3	-4	34	-113	6	-11	3	-46	-24	10	-2	-2	-125	-3028
0	4	-3	644	946	3	-3	-3	399	-941	6	-11	4	14	-69	10	-2	-1	3840	2931
0	4	-2	-518	1304	3	-3	-2	3451	-7506	6	-11	5	16	47	10	-2	0	7261	2481
0	4	-1	50	-2471	3	-3	-1	25275	-53316	6	-11	6	-0	21	10	-2	1	557	215

Table 1 (Cont.)

6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin
0	4	0	-760	-1341	3	-3	0	-46154	574408	6	-11	7	-6	-23	10	-2	2	51	14
0	4	1	-61	-91	3	-3	1	-54122	164016	6	-11	8	15	12	10	-2	3	3	-5
0	4	2	-8	-4	3	-3	2	15411	-243037	6	-11	9	-10	5	10	-2	4	-0	-1
0	4	3	-0	2	3	-3	3	5267	-39758	6	-10	-3	1	-0	10	-1	-7	2	11
0	4	4	0	-2	3	-3	4	832	-5211	6	-10	-2	1	-0	10	-1	-6	-16	17
0	5	-8	-3	1	3	-3	5	137	-670	6	-10	-1	-27	11	10	-1	-5	7	-4
0	5	-7	-41	1	3	-3	6	19	-85	6	-10	0	-275	73	10	-1	-4	-95	85
0	5	-6	13	21	3	-3	7	-22	-23	6	-10	1	366	-709	10	-1	-3	-427	9
0	5	-5	37	-14	3	-3	8	7	-1	6	-10	2	-43	-127	10	-1	-2	-584	-540
0	5	-4	201	-33	3	-3	9	4	2	6	-10	3	-170	81	10	-1	-1	1485	101
0	5	-3	-218	349	3	-2	-8	2	-5	6	-10	4	121	50	10	-1	0	1623	-557
0	5	-2	-264	121	3	-2	-7	-2	4	6	-10	5	20	55	10	-1	1	138	-47
0	5	-1	480	-322	3	-2	-6	-4	1	6	-10	6	-13	41	10	-1	2	12	-3
0	5	0	59	-378	3	-2	-5	-74	-97	6	-10	7	9	-35	10	-1	3	-4	3
0	5	1	5	-31	3	-2	-4	-650	-781	6	-10	8	1	-14	10	0	-7	1	3
0	5	2	1	-3	3	-2	-3	-4819	-6027	6	-10	9	-2	4	10	0	-6	4	40
0	6	-9	-5	2	3	-2	-2	-42524	-56643	6	-9	-4	-7	2	10	0	-5	-3	-17
0	6	-8	-26	16	3	-2	-1	-390699	-635414	6	-9	-3	-57	17	10	0	-4	-21	-8
0	6	-7	-53	40	3	-2	0	1287099	-227997	6	-9	-2	-517	156	10	0	-3	-141	-210
0	6	-6	49	-50	3	-2	1	832086	636959	6	-9	-1	-4883	1454	10	0	-2	2	-105
0	6	-5	95	-40	3	-2	2	-421538	138033	6	-9	0	-50886	15060	10	0	-1	194	188
0	6	-4	21	69	3	-2	3	-111319	29091	6	-9	1	21134	-17116	10	0	0	285	-40
0	6	-3	-164	17	3	-2	4	-16814	4192	6	-9	2	53963	-17513	10	0	1	23	-2
0	6	-2	-123	315	3	-2	5	-2277	545	6	-9	3	-2047	4325	10	0	2	0	3
0	6	-1	221	81	3	-2	6	-290	27	6	-9	4	-305	850	10	1	-7	14	14
0	6	0	137	-369	3	-2	7	-52	19	6	-9	5	-41	141	10	1	-6	43	43
0	6	1	17	-31	3	-2	8	28	27	6	-9	6	-39	15	10	1	-5	-18	13
0	6	2	2	-3	3	-2	9	10	7	6	-9	7	-7	-67	10	1	-4	-49	-37
0	7	-9	2	-5	3	-2	10	-7	-4	6	-9	8	2	3	10	1	-3	2	-71
0	7	-8	-8	23	3	-1	-9	2	-0	6	-9	9	0	1	10	1	-2	-5	-7
0	7	-7	-20	-5	3	-1	-8	0	-3	6	-8	-4	-4	0	10	1	-1	10	57
0	7	-6	14	-29	3	-1	-7	-3	-18	6	-8	-3	-44	4	10	1	0	69	-4
0	7	-5	32	15	3	-1	-6	-39	-39	6	-8	-2	-397	30	10	1	1	2	-3
0	7	-4	-4	-7	3	-1	-5	-791	-400	6	-8	-1	-3858	209	10	1	2	-3	1
0	7	-3	-21	44	3	-1	-4	-6181	-2974	6	-8	0	-44608	2031	10	2	-8	-4	-1
0	7	-2	38	37	3	-1	-3	-48638	-22491	6	-8	1	-44551	10624	10	2	-7	23	1
0	7	-1	4	-19	3	-1	-2	-330921	-137713	6	-8	2	37894	-2903	10	2	-6	9	17
0	7	0	-8	-19	3	-1	-1	94566	179297	6	-8	3	17201	-3018	10	2	-5	-22	1
0	7	1	-2	-2	3	-1	0	1003760	457871	6	-8	4	2239	-190	10	2	-4	-20	-12
0	8	-9	-4	-10	3	-1	1	-27505	-133646	6	-8	5	296	-15	10	2	-3	5	15
0	8	-8	10	2	3	-1	2	-8945	-16213	6	-8	6	33	-8	10	2	-2	-45	5
0	8	-7	0	15	3	-1	3	-1166	-1829	6	-8	7	-23	-25	10	2	-1	-7	11
0	8	-6	-4	-10	3	-1	4	-171	-213	6	-8	8	-6	-6	10	2	0	73	8
0	8	-5	-10	-23	3	-1	5	-13	-22	6	-7	-3	0	-20	10	2	1	6	-0
0	8	-4	13	7	3	-1	6	21	-1	6	-7	-2	54	-213	10	3	-8	-9	6
0	8	-3	-1	3	3	-1	7	-0	5	6	-7	-1	554	-2278	10	3	-7	3	-2
0	9	-9	1	-5	3	-1	8	-23	1	6	-7	0	5558	-30933	10	3	-6	11	-8
0	9	-8	4	1	3	-1	9	-4	1	6	-7	1	-2058	-32431	10	3	-5	5	2
0	9	-7	-1	5	3	-1	10	6	-0	6	-7	2	-2150	21974	10	3	-4	-4	13
0	9	-6	-4	-4	3	0	-8	-1	-1	6	-7	3	475	10736	10	3	-3	-3	-1
0	9	-4	1	3	3	0	-7	-1	-2	6	-7	4	-198	1397	10	4	-9	-1	3
1	-13	1	3	-7	3	0	-6	-135	5	6	-7	5	-30	159	10	4	-8	-5	1
1	-13	3	-3	7	3	0	-5	-609	241	6	-7	6	-23	17	10	4	-7	1	-7
1	-13	8	2	-1	3	0	-4	-4061	1505	6	-7	7	-10	4	10	4	-6	5	-1
1	-13	9	3	1	3	0	-3	-25226	9849	6	-7	8	-2	0	10	4	-5	-0	3
1	-13	10	-3	5	3	0	-2	-91307	32793	6	-6	-4	2	2	10	21	-7	-0	1
1	-13	11	-3	-1	3	0	-1	66705	-21356	6	-6	-3	29	33	10	21	-6	-3	10
1	-13	12	1	-4	3	0	0	239195	-80709	6	-6	-2	249	284	10	21	-5	-35	105
1	-12	6	-11	-5	3	0	1	18009	-12762	6	-6	-1	2467	2380	10	21	-3	36	-110
1	-12	7	2	-18	3	0	2	1480	-1244	6	-6	0	28661	5075	10	21	-2	3	-10
1	-12	8	7	2	3	0	3	156	-151	6	-6	1	23331	-5884	10	21	-1	0	-1
1	-12	9	-3	-24	3	0	4	17	-22	6	-6	2	-14659	-4428	11	-19	1	0	-2
1	-12	10	-16	5	3	0	5	-5	5	6	-6	3	-7427	103	11	-19	3	-0	2

Table 1 (Cont.)

6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin
1	-12	11	-1	-1	3	1	-11	-1	-6	6	-6	4	-1297	156	11	-18	0	2	0
1	-12	12	5	-7	3	1	-10	-4	2	6	-6	5	-171	10	11	-18	1	20	2
1	-11	3	0	1	3	1	-9	1	27	6	-6	6	-40	20	11	-18	3	-25	-3
1	-11	4	2	10	3	1	-8	6	26	6	-6	7	-9	5	11	-18	4	-2	-0
1	-11	5	-12	7	3	1	-7	-39	-4	6	-5	-5	-1	-1	11	-17	-2	-1	3
1	-11	6	-6	-27	3	1	-6	-71	0	6	-5	-4	-8	-5	11	-17	-1	-14	30
1	-11	7	-3	-14	3	1	-5	-77	-25	6	-5	-3	-90	-26	11	-17	0	-135	291
1	-11	8	-6	-21	3	1	-4	321	-1052	6	-5	-2	-717	-164	11	-17	1	-1401	3097
1	-11	9	11	-15	3	1	-3	6451	-15385	6	-5	-1	-5304	-913	11	-17	2	30	71
1	-11	10	20	19	3	1	-2	14289	-42311	6	-5	0	-2690	-8049	11	-17	3	1390	-3066
1	-11	11	-1	20	3	1	-1	-24110	54890	6	-5	1	13556	-14648	11	-17	4	125	-315
1	-11	12	2	-7	3	1	0	-17110	61685	6	-5	2	2502	3783	11	-17	5	13	-34
1	-10	1	2	5	3	1	1	-1137	4369	6	-5	3	-923	3625	11	-17	6	1	-3
1	-10	2	-0	5	3	1	2	-82	388	6	-5	4	-188	575	11	-16	1	-1	-7
1	-10	3	-8	-31	3	1	3	-20	44	6	-5	5	-11	69	11	-16	3	1	7
1	-10	4	4	-16	3	1	4	-23	2	6	-5	6	-1	15	11	-15	0	2	-2
1	-10	5	8	19	3	1	5	9	-6	6	-5	7	-1	3	11	-15	1	23	-23
1	-10	6	-13	23	3	1	6	2	4	6	-4	-6	1	1	11	-15	3	-15	16
1	-10	7	-34	-30	3	1	7	-1	9	6	-4	-5	3	4	11	-15	4	-2	2
1	-10	8	-1	-48	3	2	-11	8	10	6	-4	-4	-7	-22	11	-14	0	4	-5
1	-10	9	-3	2	3	2	-10	8	3	6	-4	-3	148	-202	11	-14	1	75	-68
1	-10	10	1	18	3	2	-9	-49	-53	6	-4	-2	723	-1584	11	-14	2	-38	3
1	-10	11	6	19	3	2	-8	-3	21	6	-4	-1	2363	-10295	11	-14	3	-52	48
1	-10	12	1	2	3	2	-7	-39	12	6	-4	0	1477	12075	11	-14	4	6	4
1	-9	0	1	2	3	2	-6	34	-59	6	-4	1	-2637	14266	11	-14	5	5	-6
1	-9	2	-5	-4	3	2	-5	227	131	6	-4	2	-1652	-3135	11	-13	-1	-1	0
1	-9	3	4	-10	3	2	-4	467	-960	6	-4	3	-189	-438	11	-13	0	8	-10
1	-9	4	33	4	3	2	-3	3795	-5228	6	-4	4	-71	-65	11	-13	1	397	-243
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1	-8	7	-28	-14	3	3	-5	-130	-171	6	-2	-6	-86	-36	11	-11	0	13695	-1448
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1	-7	8	8	-26	3	4	-4	314	-129	6	-1	-4	-69	-70	11	-9	-2	-7	-5
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Table 1 (Cont.)

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1	-7	11	4	-4	3	4	-1	-207	-548	6	-1	-1	-3080	176	11	-9	1	-266	121
1	-6	-3	10	-6	3	4	0	-641	108	6	-1	0	-4620	1002	11	-9	2	291	193
1	-6	-2	82	-101	3	4	1	-52	13	6	-1	1	-390	128	11	-9	3	131	46
1	-6	-1	827	-857	3	4	2	-8	3	6	-1	2	-38	18	11	-9	4	8	10
1	-6	0	9372	-9633	3	4	3	-0	-1	6	-1	3	-3	-1	11	-9	5	1	2
1	-6	1	-4706	-6428	3	4	4	-0	2	6	0	-8	-1	-4	11	-8	-3	3	-1
1	-6	2	-5790	6127	3	5	-12	2	-1	6	0	-7	3	-2	11	-8	-2	-0	-6
1	-6	3	3877	5320	3	5	-11	8	-3	6	0	-6	14	19	11	-8	-1	84	-13
1	-6	4	-1257	3589	3	5	-10	-7	2	6	0	-5	-37	-29	11	-8	0	144	-135
1	-6	5	-368	240	3	5	-9	-21	6	6	0	-4	-80	55	11	-8	1	-99	-164
1	-6	6	1	-125	3	5	-8	6	-18	6	0	-3	-257	-141	11	-8	2	-94	72
1	-6	7	10	9	3	5	-7	-17	8	6	0	-2	-531	-607	11	-8	3	-19	64
1	-6	8	0	-34	3	5	-6	-76	22	6	0	-1	1157	505	11	-8	4	0	15
1	-6	9	4	-22	3	5	-5	17	-67	6	0	0	1499	115	11	-7	-3	-5	1
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1	-5	-2	225	-174	3	5	-2	4913	-437	6	0	3	-8	0	11	-7	0	-35	48
1	-5	-1	2263	-1632	3	5	-1	281	-511	6	1	-8	-4	3	11	-7	1	-21	-155
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1	-4	9	-2	-1	3	8	-11	3	4	6	3	-2	2	-10	11	-3	-5	5	0
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1	-3	-8	2	-5	3	8	-9	-7	7	6	3	0	2	6	11	-3	-3	-33	-22
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1	-3	4	-26133	853	3	9	-7	-2	2	6	5	-9	0	3	11	-2	-4	-46	227
1	-3	5	-3475	142	3	9	-6	-7	-3	6	5	-8	-3	2	11	-2	-3	-350	-587
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Table 1 (Cont.)

6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin
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1	-3	8	-21	-30	4	-14	6	-1	-2	6	5	-4	-1	-1	11	-2	0	-105	1036
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1	-2	-11	-3	3	4	-14	10	-5	-2	7	-16	1	-2	2	11	-1	-3	2	2
1	-2	-10	3	-3	4	-14	11	-1	-2	7	-16	3	2	-2	11	-1	-1	-1	-1
1	-2	-9	-1	2	4	-13	4	0	4	7	-15	1	-3	-2	11	0	-3	1	-0
1	-2	-8	-15	13	4	-13	5	-4	0	7	-15	3	3	2	11	0	-1	-1	0
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1	-2	-6	12	-12	4	-13	7	-8	4	7	-14	5	1	1	11	20	-3	8	0
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1	-2	2	103905	-41126	4	-12	5	2	10	7	-13	6	-11	-2	12	-19	3	-8	12
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1	-2	9	-4	31	4	-11	1	-0	-1	7	-12	2	12	17	12	-18	5	-2	-1
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1	0	-5	-106	-228	4	-9	4	-53	457	7	-10	6	34	2	12	-12	-2	-2	-5
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1	0	0	132894	262122	4	-9	9	43	-7	7	-9	-4	-9	55	12	-12	3	-67	-324
1	0	1	93791	32001	4	-9	10	3	0	7	-9	-3	-79	484	12	-12	4	-16	-51
1	0	2	12926	3465	4	-9	11	1	-0	7	-9	-2	-724	4401	12	-12	5	-2	-6
1	0	3	1558	426	4	-8	-5	6	-7	7	-9	-1	-7000	42216	12	-11	-4	3	2
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Table 1 (Cont.)

6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin
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1	0	6	13	8	4	-8	-2	3845	-5029	7	-9	2	74615	-443344	12	-11	-1	2458	1310
1	0	7	6	2	4	-8	-1	36680	-47892	7	-9	3	6564	-79361	12	-11	0	26332	12026
1	0	8	-2	-1	4	-8	0	391458	-510186	7	-9	4	665	-9560	12	-11	1	3932	-100
1	1	-12	-1	-0	4	-8	1	22407	66172	7	-9	5	71	-1107	12	-11	2	-25415	-11694
1	1	-11	-13	-2	4	-8	2	-395199	521216	7	-9	6	-25	-139	12	-11	3	-3727	-1264
1	1	-10	6	-4	4	-8	3	-42929	27375	7	-9	7	29	-57	12	-11	4	-437	-138
1	1	-9	26	1	4	-8	4	-5804	2523	7	-9	8	1	5	12	-11	5	-51	-15
1	1	-8	8	10	4	-8	5	-838	216	7	-8	-4	-1	-1	12	-11	6	-6	-2
1	1	-7	6	-20	4	-8	6	-98	-13	7	-8	-3	-15	-7	12	-10	-2	-8	5
1	1	-6	-89	14	4	-8	7	-33	39	7	-8	-2	-141	-62	12	-10	-1	-94	32
1	1	-5	-580	-57	4	-8	8	29	-20	7	-8	-1	-1483	-640	12	-10	0	-314	317
1	1	-4	-4359	-733	4	-8	9	4	-5	7	-8	0	-19641	-7331	12	-10	1	52	233
1	1	-3	-29928	-5022	4	-8	10	3	-5	7	-8	1	-19921	-3213	12	-10	2	265	-260
1	1	-2	-67737	-11855	4	-8	11	1	-1	7	-8	2	15852	5541	12	-10	3	58	-104
1	1	-1	100220	9938	4	-7	-4	4	-4	7	-8	3	7044	1870	12	-10	4	4	-8
1	1	0	150794	28896	4	-7	-3	38	-36	7	-8	4	866	292	12	-9	-3	3	-0
1	1	1	12517	6775	4	-7	-2	383	-352	7	-8	5	111	29	12	-9	-2	-1	-2
1	1	2	1177	775	4	-7	-1	3785	-3480	7	-8	6	24	-33	12	-9	-1	4	-53
1	1	3	118	104	4	-7	0	44226	-40652	7	-8	7	-3	-22	12	-9	0	-39	-114
1	1	4	-2	14	4	-7	1	16847	-50708	7	-8	8	-3	-6	12	-9	1	-83	2
1	1	5	16	-9	4	-7	2	-25720	33514	7	-7	-3	21	-9	12	-9	2	39	84
1	1	6	7	-4	4	-7	3	-9967	21216	7	-7	-2	182	-67	12	-9	3	23	34
1	1	7	9	-21	4	-7	4	-2653	3060	7	-7	-1	1614	-650	12	-9	4	-5	3
1	1	8	-1	4	4	-7	5	-282	88	7	-7	0	10949	-9276	12	-9	5	1	0
1	1	9	-3	4	4	-7	6	-31	-25	7	-7	1	5788	-10629	12	-8	-3	-0	4
1	2	-13	-6	3	4	-7	7	13	-4	7	-7	2	-6296	7478	12	-8	-2	1	-3
1	2	-12	-15	12	4	-7	8	-0	-49	7	-7	3	-2451	3460	12	-8	-1	30	5
1	2	-11	12	-9	4	-7	9	1	-4	7	-7	4	-463	294	12	-8	0	81	-37
1	2	-10	80	-55	4	-7	10	0	-1	7	-7	5	-40	36	12	-8	1	68	-88
1	2	-9	-10	12	4	-6	-4	8	-6	7	-7	6	-55	-29	12	-8	2	-52	31
1	2	-8	-37	47	4	-6	-3	82	-29	7	-7	7	-2	-4	12	-8	3	-40	25
1	2	-7	11	-11	4	-6	-2	773	-269	7	-7	8	-1	-0	12	-8	4	-1	-3
1	2	-6	-68	23	4	-6	-1	7915	-2732	7	-6	-4	0	3	12	-7	-3	-2	-2
1	2	-5	-457	69	4	-6	0	100462	-34251	7	-6	-3	-2	41	12	-7	-2	0	-2
1	2	-4	-3420	850	4	-6	1	118016	-79762	7	-6	-2	8	317	12	-7	-1	-23	16
1	2	-3	-15758	2009	4	-6	2	-61991	40739	7	-6	-1	812	2535	12	-7	0	-49	53
1	2	-2	-17047	2342	4	-6	3	-35784	25526	7	-6	0	16293	12503	12	-7	1	22	-69
1	2	-1	62831	-11981	4	-6	4	-5720	1049	7	-6	1	16685	5666	12	-7	2	22	-25
1	2	0	87118	-24287	4	-6	5	-898	-233	7	-6	2	-7334	-7060	12	-7	3	4	17
1	2	1	6621	-1832	4	-6	6	-116	-74	7	-6	3	-4530	-2685	12	-7	4	0	2
1	2	2	637	-224	4	-6	7	-40	-35	7	-6	4	-797	-387	12	-6	-3	-0	-1
1	2	3	72	-30	4	-6	8	-10	-10	7	-6	5	-101	-58	12	-6	-2	-5	-12
1	2	4	-2	5	4	-6	9	-2	-2	7	-6	6	-28	-3	12	-6	-1	-39	-82
1	2	5	-12	14	4	-5	-4	11	13	7	-6	7	-11	-3	12	-6	0	27	63
1	2	6	20	-1	4	-5	-3	78	120	7	-5	-5	-2	1	12	-6	1	46	100
1	2	7	-11	17	4	-5	-2	723	1175	7	-5	-4	-7	-8	12	-6	2	-8	-8
1	2	8	-1	-4	4	-5	-1	7994	12590	7	-5	-3	-26	-22	12	-6	3	-0	-1
1	2	9	2	-3	4	-5	0	126010	178243	7	-5	-2	-365	-354	12	-5	-3	11	7
1	3	-12	1	-1	4	-5	1	148735	149591	7	-5	-1	-2534	-2132	12	-5	-2	54	33
1	3	-11	10	-4	4	-5	2	-54329	-93947	7	-5	0	-3037	-4086	12	-5	-1	-77	-15
1	3	-10	12	-11	4	-5	3	-40786	-45215	7	-5	1	9151	-2423	12	-5	0	-206	-104
1	3	-9	-73	33	4	-5	4	-7630	-7266	7	-5	2	2137	2262	12	-5	1	66	9
1	3	-8	-20	16	4	-5	5	-1131	-975	7	-5	3	-891	1267	12	-5	2	11	1
1	3	-7	-34	25	4	-5	6	-137	-127	7	-5	4	-195	193	12	-4	-5	-4	1
1	3	-6	-47	32	4	-5	7	-42	-21	7	-5	5	-29	36	12	-4	-4	-35	14
1	3	-5	-355	334	4	-5	8	-7	-2	7	-5	6	-6	7	12	-4	-3	-162	39
1	3	-4	-964	424	4	-4	-5	-6	-8	7	-4	-5	1	-5	12	-4	-2	-683	152
1	3	-3	-518	-4199	4	-4	-4	-14	-46	7	-4	-4	22	-12	12	-4	-1	485	-59
1	3	-2	-2421	-2933	4	-4	-3	-133	-335	7	-4	-3	225	-108	12	-4	0	1817	-445
1	3	-1	13383	1494	4	-4	-2	-1301	-3004	7	-4	-2	1436	-1150	12	-4	1	151	-55
1	3	0	17442	-4628	4	-4	-1	-12426	-27000	7	-4	-1	8799	-9304	12	-4	2	3	-9
1	3	1	1359	-355	4	-4	0	4798	-62407	7	-4	0	-3225	4006	12	-4	3	-4	-2

Table 1 (Cont.)

6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin
1	3	2	135	-32	4	-4	1	118411	-3898	7	-4	1	-10909	10921	12	-3	-5	-3	-2
1	3	3	82	-39	4	-4	2	2954	32282	7	-4	2	-479	-315	12	-3	-4	-2	6
1	3	4	-2	-12	4	-4	3	-19925	11539	7	-4	3	-48	89	12	-3	-3	-9	32
1	3	5	-23	-9	4	-4	4	-3345	1748	7	-4	4	-13	6	12	-3	-2	2	10
1	3	6	-1	-6	4	-4	5	-518	239	7	-4	5	6	2	12	-3	-1	30	-49
1	3	7	-1	3	4	-4	6	-49	49	7	-4	6	-0	3	12	-3	0	-21	-34
1	4	-10	1	2	4	-4	7	-17	7	7	-3	-6	-6	1	12	-3	2	5	1
1	4	-9	3	12	4	-4	8	-3	1	7	-3	-5	-10	14	12	-2	-10	2	0
1	4	-8	-5	5	4	-3	-6	1	-1	7	-3	-4	-14	117	12	-2	-9	3	-3
1	4	-7	17	65	4	-3	-5	21	-5	7	-3	-3	-86	965	12	-2	-8	-6	12
1	4	-6	-64	-1	4	-3	-4	224	-78	7	-3	-2	-870	6153	12	-2	-7	-20	2
1	4	-5	-199	-61	4	-3	-3	1836	-591	7	-3	-1	-2765	-11727	12	-2	-6	-2	-13
1	4	-4	-216	-1328	4	-3	-2	14846	-5454	7	-3	0	1384	-23798	12	-2	-5	26	-7
1	4	-3	140	-2068	4	-3	-1	101034	-52747	7	-3	1	2857	11016	12	-2	-4	-26	89
1	4	-2	-632	-295	4	-3	0	-52006	64149	7	-3	2	472	1413	12	-2	-3	-41	-119
1	4	-1	1900	1401	4	-3	1	-130534	72030	7	-3	3	49	141	12	-2	-2	153	-66
1	4	0	3399	-544	4	-3	2	3388	-20551	7	-3	4	13	-9	12	-2	-1	-136	154
1	4	1	238	-21	4	-3	3	987	-3066	7	-3	5	4	1	12	-2	0	-36	127
1	4	2	21	21	4	-3	4	86	-482	7	-3	6	-2	7	12	-2	1	-2	8
1	4	3	-7	-15	4	-3	5	11	-60	7	-2	-8	-5	-7	12	20	-6	-7	-2
1	4	4	0	-5	4	-3	6	18	-9	7	-2	-7	-27	-51	12	20	-5	-74	-24
1	4	5	-1	5	4	-3	7	1	-1	7	-2	-6	-135	-286	12	20	-3	81	27
1	4	6	-4	-1	4	-3	8	-3	0	7	-2	-5	-1315	-2072	12	20	-2	7	2
1	5	-10	-1	2	4	-2	-8	1	-0	7	-2	-4	-10189	-15678	12	21	-6	-10	3
1	5	-9	15	33	4	-2	-7	4	7	7	-2	-3	-68442	-104373	12	21	-5	-103	34
1	5	-8	19	0	4	-2	-6	4	28	7	-2	-2	-273393	-388315	12	21	-3	89	-29
1	5	-7	-11	-10	4	-2	-5	-61	225	7	-2	-1	149718	288343	12	21	-2	10	-3
1	5	-6	-61	-52	4	-2	-4	-332	1854	7	-2	0	731174	1052362	12	22	-5	-2	-0
1	5	-5	-220	-271	4	-2	-3	-1793	15134	7	-2	1	70479	70137	12	22	-3	2	0
1	5	-4	-134	-433	4	-2	-2	-10641	124199	7	-2	2	6557	5682	13	-20	1	2	-2
1	5	-3	170	-437	4	-2	-1	67337	695013	7	-2	3	689	562	13	-20	3	-2	2
1	5	-2	-575	32	4	-2	0	320631	231753	7	-2	4	77	60	13	-19	0	5	-4
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1	5	0	1079	-43	4	-2	2	-99259	-214437	7	-1	-8	-1	-1	13	-19	3	-57	39
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1	5	2	15	3	4	-2	4	-1527	-3270	7	-1	-6	49	-15	13	-18	-2	3	6
1	5	3	-3	-3	4	-2	5	-181	-380	7	-1	-5	-8	30	13	-18	-1	29	52
1	6	-11	3	2	4	-2	6	-57	-63	7	-1	-4	-255	8	13	-18	0	273	484
1	6	-9	-15	-2	4	-2	7	-9	-5	7	-1	-3	-892	-83	13	-18	1	2906	5148
1	6	-8	33	-22	4	-2	8	11	10	7	-1	-2	-1467	908	13	-18	2	-8	16
1	6	-7	-26	-0	4	-2	9	1	0	7	-1	-1	3106	-677	13	-18	3	-3003	-5319
1	6	-6	-93	-13	4	-1	-8	-1	0	7	-1	0	5160	-995	13	-18	4	-271	-489
1	6	-5	-135	-65	4	-1	-7	-12	0	7	-1	1	357	-61	13	-18	5	-29	-52
1	6	-4	-91	-108	4	-1	-6	-10	-14	7	-1	2	37	25	13	-18	6	-3	-6
1	6	-3	-553	131	4	-1	-5	46	-174	7	-1	3	6	1	13	-17	0	-6	2
1	6	-2	-6457	251	4	-1	-4	701	-1960	7	-1	4	-1	-4	13	-17	1	-76	22
1	6	-1	147	-436	4	-1	-3	4829	-14514	7	0	-7	4	4	13	-17	3	64	-19
1	6	0	6423	-264	4	-1	-2	20876	-66293	7	0	-6	-1	16	13	-17	4	6	-2
1	6	1	611	-28	4	-1	-1	-13886	26866	7	0	-5	-28	17	13	-16	0	-4	0
1	6	2	62	-4	4	-1	0	-57249	177725	7	0	-4	-109	22	13	-16	1	-56	3
1	6	3	6	1	4	-1	1	-1129	15539	7	0	-3	-207	-169	13	-16	3	40	-2
1	6	4	-1	-1	4	-1	2	-16	1377	7	0	-2	-253	-530	13	-16	4	4	-0
1	7	-12	2	-0	4	-1	3	46	139	7	0	-1	991	539	13	-15	-1	-0	1
1	7	-11	6	-1	4	-1	4	-1	26	7	0	0	1435	124	13	-15	0	-6	1
1	7	-10	30	-6	4	-1	5	-6	0	7	0	1	125	8	13	-15	1	-82	-5
1	7	-9	0	-8	4	-1	6	9	-2	7	0	2	10	2	13	-15	2	-7	24
1	7	-8	57	-20	4	-1	7	-2	-0	7	0	3	-5	1	13	-15	3	52	2
1	7	-7	-43	46	4	-1	8	-8	-1	7	1	-7	-7	2	13	-15	4	9	-8
1	7	-6	-87	23	4	0	-8	-2	5	7	1	-6	-16	48	13	-15	5	0	-1
1	7	-5	-44	-24	4	0	-7	-12	-0	7	1	-5	-3	-21	13	-14	-1	-0	1
1	7	-4	27	-9	4	0	-6	-56	34	7	1	-4	-29	-25	13	-14	0	-3	-7
1	7	-3	13	-4	4	0	-5	-202	-73	7	1	-3	-20	-197	13	-14	1	-48	-244
1	7	-2	6	-9	4	0	-4	-1716	-431	7	1	-2	76	-103	13	-14	2	-17	-30

Table 1 (Cont.)

6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin
1	7	-1	2	-3	4	0	-3	-9745	-1577	7	1	-1	75	194	13	-14	3	20	112
1	7	0	-0	2	4	0	-2	-23868	-2041	7	1	0	213	73	13	-14	4	9	18
1	8	-11	-4	7	4	0	-1	33440	5279	7	1	1	16	7	13	-13	-2	-1	-0
1	8	-10	19	-12	4	0	0	61370	8001	7	1	2	-2	4	13	-13	-1	-7	-2
1	8	-9	25	-9	4	0	1	4624	509	7	1	3	-1	-0	13	-13	0	-42	-17
1	8	-8	13	11	4	0	2	404	38	7	2	-9	1	1	13	-13	1	376	-2
1	8	-7	-27	13	4	0	3	43	7	7	2	-8	6	1	13	-13	2	87	35
1	8	-6	-40	15	4	0	4	6	3	7	2	-7	8	11	13	-13	3	-141	2
1	8	-5	-2	31	4	1	-9	1	-2	7	2	-6	-19	23	13	-13	4	-15	-3
1	8	-4	-7	2	4	1	-8	6	-28	7	2	-5	-18	8	13	-12	-3	0	-2
1	8	-3	1	-11	4	1	-7	-21	7	7	2	-4	-28	-48	13	-12	-2	1	-9
1	8	-2	6	-2	4	1	-6	-37	130	7	2	-3	15	-63	13	-12	-1	31	-87
1	8	-1	1	-0	4	1	-5	-239	72	7	2	-2	12	-8	13	-12	0	635	-863
1	8	0	2	0	4	1	-4	-714	-12	7	2	-1	-7	46	13	-12	1	-116	736
1	9	-12	-3	6	4	1	-3	-1131	-1764	7	2	0	29	21	13	-12	2	-717	996
1	9	-11	-3	10	4	1	-2	55	-5141	7	2	1	2	-2	13	-12	3	14	-165
1	9	-10	17	0	4	1	-1	5375	6464	7	2	2	0	-1	13	-12	4	6	-24
1	9	-9	-8	1	4	1	0	9983	5011	7	3	-8	-6	-5	13	-12	5	0	-2
1	9	-8	-33	2	4	1	1	750	415	7	3	-7	19	1	13	-11	-2	3	12
1	9	-7	19	17	4	1	2	89	20	7	3	-6	5	21	13	-11	-1	36	116
1	9	-6	6	15	4	1	3	3	29	7	3	-5	-2	20	13	-11	0	497	725
1	9	-5	-4	2	4	1	4	-9	7	7	3	-4	-13	-21	13	-11	1	296	46
1	10	-12	1	3	4	1	5	-2	-3	7	3	-3	-4	-16	13	-11	2	-434	-653
1	10	-11	-3	5	4	1	6	1	-3	7	3	-2	-15	-8	13	-11	3	-131	-122
1	10	-10	-4	-1	4	2	-10	-2	-0	7	3	-1	-6	7	13	-11	4	-16	-14
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2	-12	9	58	29	4	4	-6	-27	-29	8	-13	7	-1	-7	13	-4	-1	184	-5
2	-12	10	-29	27	4	4	-5	-50	-82	8	-12	0	1	8	13	-4	0	450	-55
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Table 1 (Cont.)

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2	-11	9	40	8	4	5	-7	-8	17	8	-11	1	-1387	98	13	-2	-5	27	7
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2	-10	1	2	1	4	5	-2	-16	-9	8	-11	6	-4	6	13	-2	0	-24	18
2	-10	2	10	-9	4	5	-1	6	4	8	-11	7	5	6	13	-2	2	3	-1
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2	-8	4	-3462	18	5	-16	13	3	-3	8	-8	4	283	240	14	-19	4	-15	-11
2	-8	5	-1174	-2482	5	-16	14	4	1	8	-8	5	-22	76	14	-19	5	-3	0
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Table 1 (Cont.)

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2	-7	2	-517365	-1053231	5	-14	2	-16	7	8	-6	-2	-150	68	14	-16	3	14	-35
2	-7	3	-100692	-70808	5	-14	4	1	-1	8	-6	-1	-711	495	14	-16	4	2	-3
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2	-4	-1	-35810	167802	5	-11	12	14	41	8	-2	1	11498	20164	14	-6	2	-5	2
2	-4	0	-502595	2259623	5	-11	13	1	1	8	-2	2	1037	1757	14	-5	-3	-0	-2
2	-4	1	-320714	2474882	5	-11	14	1	1	8	-2	3	107	181	14	-5	-1	0	2
2	-4	2	239040	-1099043	5	-10	-1	-6	-5	8	-2	4	19	21	14	-4	-5	-4	8
2	-4	3	102712	-688484	5	-10	0	-30	-49	8	-2	5	2	2	14	-4	-4	6	11
2	-4	4	18904	-115087	5	-10	1	81	-116	8	-1	-8	3	1	14	-4	-3	-13	-13
2	-4	5	2733	-15847	5	-10	2	-159	-6	8	-1	-7	6	-5	14	-4	-2	-41	-29
2	-4	6	370	-2021	5	-10	3	-66	-298	8	-1	-6	48	-19	14	-4	-1	35	26
2	-4	7	53	-267	5	-10	4	625	-236	8	-1	-5	15	43	14	-4	0	60	10

Table 1 (Cont.)

6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin
2	-4	8	9	-54	5	-10	5	577	809	8	-1	-4	-121	-11	14	-4	1	7	-4
2	-4	9	1	-9	5	-10	6	-737	633	8	-1	-3	-37	-92	14	-4	2	2	-1
2	-4	10	0	-1	5	-10	7	-360	-335	8	-1	-2	-112	111	14	-2	-8	-6	-9
2	-3	-8	8	2	5	-10	8	-42	-99	8	-1	-1	267	-10	14	-2	-7	-5	6
2	-3	-6	25	-12	5	-10	9	42	39	8	-1	0	404	-49	14	-2	-6	10	1
2	-3	-5	-21	-7	5	-10	10	-17	-4	8	-1	1	54	5	14	-2	-5	14	1
2	-3	-4	27	-48	5	-10	11	-7	-16	8	-1	3	-7	-1	14	-2	-4	-5	6
2	-3	-3	849	-585	5	-10	12	7	2	8	0	-7	3	1	14	-2	-3	7	6
2	-3	-2	6746	-5641	5	-10	13	3	2	8	0	-6	-2	-2	14	-2	-2	-8	-3
2	-3	-1	43543	-63695	5	-10	14	1	1	8	0	-5	-4	13	14	-2	-1	5	-0
2	-3	0	-484931	-437132	5	-9	-3	-3	-4	8	0	-4	16	33	14	19	-6	0	-2
2	-3	1	53311	661539	5	-9	-2	-24	-35	8	0	-3	-31	-35	14	19	-5	4	-18
2	-3	2	229406	236845	5	-9	-1	-238	-365	8	0	-2	-16	-82	14	19	-3	-3	16
2	-3	3	-3010	-91962	5	-9	0	-2333	-3668	8	0	-1	113	90	14	19	-2	-0	2
2	-3	4	-2148	-17151	5	-9	1	3530	-1583	8	0	0	145	29	14	19	-1	2	-6
2	-3	5	-327	-2421	5	-9	2	1741	2948	8	0	1	8	4	14	19	1	1	-2
2	-3	6	-88	-325	5	-9	3	0	-1218	8	0	2	-4	3	14	20	-7	-1	-4
2	-3	7	4	-22	5	-9	4	3314	1153	8	0	3	-1	-0	14	20	-6	-9	-32
2	-3	8	17	-21	5	-9	5	-562	3655	8	1	-7	-4	2	14	20	-5	-82	-286
2	-3	9	-7	-6	5	-9	6	-1828	-286	8	1	-6	9	-14	14	20	-4	15	64
2	-3	10	-3	1	5	-9	7	-301	-212	8	1	-5	3	9	14	20	-3	76	264
2	-3	11	1	0	5	-9	8	22	-5	8	1	-4	-21	21	14	20	-2	2	6
2	-2	-10	-4	-2	5	-9	9	4	-3	8	1	-3	-8	-9	14	20	-1	0	1
2	-2	-9	2	-2	5	-9	10	-27	21	8	1	-2	28	-9	14	21	-6	-6	-5
2	-2	-8	-3	-6	5	-9	11	28	7	8	1	-1	3	32	14	21	-5	-65	-52
2	-2	-7	-14	-6	5	-9	12	5	1	8	1	0	16	13	14	21	-4	2	2
2	-2	-6	29	16	5	-9	13	4	-0	8	1	1	1	-2	14	21	-3	45	37
2	-2	-5	327	143	5	-8	-5	-1	-3	8	1	2	-0	-1	14	21	-2	6	5
2	-2	-4	2584	1130	5	-8	-4	-13	-23	8	2	-7	-3	0	14	22	-6	-3	-0
2	-2	-3	21757	9828	5	-8	-3	-120	-213	8	2	-6	2	0	14	22	-5	-3	-8
2	-2	-2	188668	81095	5	-8	-2	-1097	-1953	8	2	-4	-9	-0	14	22	-4	6	0
2	-2	-1	1589543	577817	5	-8	-1	-10602	-18845	8	2	-3	5	2	14	22	-3	2	5
2	-2	0	343936	-722662	5	-8	0	-117882	-208662	8	2	-2	4	9	14	25	-6	2	-2
2	-2	1	-1662984	-919605	5	-8	1	-81092	-8024	8	2	-1	10	0	14	25	-4	-2	2
2	-2	2	-340298	213512	5	-8	2	104029	184116	8	2	0	1	1	14	26	-6	3	-3
2	-2	3	-80030	59218	5	-8	3	47390	15519	8	2	1	-2	0	14	26	-4	-3	3
2	-2	4	-11168	6466	5	-8	4	12200	15080	8	3	-8	1	2	15	-25	2	-1	-2
2	-2	5	-1371	635	5	-8	5	-6169	3704	8	3	-7	-2	-1	15	-25	4	1	2
2	-2	6	-117	112	5	-8	6	-1203	-22	8	3	-6	-1	-3	15	-20	0	4	-1
2	-2	7	-32	12	5	-8	7	54	-155	8	3	-5	3	2	15	-20	1	29	-5
2	-2	8	-7	-4	5	-8	8	42	-37	8	3	-4	0	2	15	-20	2	30	51
2	-2	9	-23	-7	5	-8	9	-40	1	8	3	-3	5	-3	15	-20	3	-40	7
2	-2	10	-29	-12	5	-8	10	-8	5	8	3	-2	-38	-37	15	-20	4	-15	-19
2	-2	11	-3	-2	5	-8	11	14	-8	8	3	-1	-6	3	15	-19	-2	4	2
2	-2	12	8	3	5	-8	12	2	-2	8	3	0	38	37	15	-19	-1	35	16
2	-1	-11	5	-0	5	-8	13	1	-1	8	3	1	1	5	15	-19	0	375	151
2	-1	-10	4	-1	5	-7	-5	-0	-1	8	4	-7	-2	3	15	-19	1	3408	1582
2	-1	-9	-3	8	5	-7	-4	-5	-14	8	4	-6	1	-1	15	-19	2	-44	125
2	-1	-8	12	9	5	-7	-3	-37	-130	8	4	-5	-2	3	15	-19	3	-3681	-1702
2	-1	-7	-8	21	5	-7	-2	-349	-1204	8	4	-4	-1	1	15	-19	4	-311	-191
2	-1	-6	-231	71	5	-7	-1	-3469	-12037	8	22	-8	0	3	15	-19	5	-31	-21
2	-1	-5	-1881	611	5	-7	0	-41823	-145240	8	22	-7	3	28	15	-19	6	-4	-2
2	-1	-4	-15338	5164	5	-7	1	-129498	-84918	8	22	-6	32	268	15	-18	-1	1	8
2	-1	-3	-121685	41746	5	-7	2	49088	54482	8	22	-5	339	2879	15	-18	0	6	83
2	-1	-2	-834594	303091	5	-7	3	91554	50166	8	22	-3	-340	-2882	15	-18	1	66	922
2	-1	-1	1153563	327951	5	-7	4	-10646	34878	8	22	-2	-32	-268	15	-18	2	-1	-12
2	-1	0	3072674	-883839	5	-7	5	-4899	3007	8	22	-1	-3	-28	15	-18	3	-58	-810
2	-1	1	-1057293	-378259	5	-7	6	-255	-953	8	22	0	-0	-3	15	-18	4	-6	-79
2	-1	2	-144237	-22705	5	-7	7	71	-326	9	-17	1	1	1	15	-18	5	-1	-8
2	-1	3	-16630	-1964	5	-7	8	25	-62	9	-17	3	-1	-1	15	-17	0	2	3
2	-1	4	-1949	-227	5	-7	9	20	-21	9	-16	0	-2	0	15	-17	1	26	36
2	-1	5	-282	26	5	-7	10	9	-20	9	-16	1	-28	2	15	-17	3	-19	-27
2	-1	6	-17	1	5	-7	11	-2	-1	9	-16	3	28	-2	15	-17	4	-2	-3

Table 1 (Cont.)

6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin
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2	-1	8	24	-17	5	-6	-5	0	-6	9	-15	1	0	-2	15	-16	1	-26	58
2	-1	9	-5	5	5	-6	-4	4	-38	9	-15	2	1	0	15	-16	2	1	-2
2	-1	10	-4	3	5	-6	-3	58	-362	9	-15	3	-0	2	15	-16	3	16	-37
2	0	-9	-3	6	5	-6	-2	552	-3374	9	-15	4	-1	-0	15	-16	4	2	-3
2	0	-8	-1	-4	5	-6	-1	5760	-34895	9	-14	1	3	8	15	-15	0	-2	1
2	0	-7	14	-20	5	-6	0	78186	-452445	9	-14	2	2	5	15	-15	1	-83	-32
2	0	-6	84	-127	5	-6	1	-200039	-480008	9	-14	3	-8	-5	15	-15	2	-3	-5
2	0	-5	308	-532	5	-6	2	187841	153019	9	-14	4	-4	-4	15	-15	3	39	15
2	0	-4	2441	-3188	5	-6	3	54341	265392	9	-14	5	4	-0	15	-15	4	4	1
2	0	-3	15032	-19856	5	-6	4	-20822	43364	9	-14	6	3	3	15	-14	-1	-2	1
2	0	-2	34915	-43037	5	-6	5	-5398	-2441	9	-14	7	-2	0	15	-14	0	-10	5
2	0	-1	-52627	95771	5	-6	6	-962	-1409	9	-13	-1	7	0	15	-14	1	49	-73
2	0	0	-98249	127159	5	-6	7	-104	-300	9	-13	0	7	-2	15	-14	2	21	-14
2	0	1	-10208	-7746	5	-6	8	5	-79	9	-13	1	-6	47	15	-14	3	-17	28
2	0	2	-1241	-616	5	-6	9	-7	7	9	-13	2	31	-37	15	-14	4	-2	3
2	0	3	-178	27	5	-6	10	-6	-9	9	-13	3	15	-36	15	-13	-2	-2	-1
2	0	4	-20	6	5	-6	11	-1	-1	9	-13	4	-6	7	15	-13	-1	-7	-4
2	0	5	13	-20	5	-5	-6	-1	-1	9	-13	5	-8	8	15	-13	0	-22	-109
2	0	6	4	-8	5	-5	-5	7	-17	9	-13	6	-9	7	15	-13	1	84	61
2	1	-13	-0	-1	5	-5	-4	74	-126	9	-13	7	0	-2	15	-13	2	30	131
2	1	-11	3	13	5	-5	-3	713	-1176	9	-12	-1	1	-2	15	-13	3	-22	-19
2	1	-10	-1	-11	5	-5	-2	6921	-11107	9	-12	0	14	-0	15	-13	4	-2	-1
2	1	-9	21	36	5	-5	-1	76080	-119530	9	-12	1	-131	556	15	-12	-2	4	2
2	1	-8	17	-3	5	-5	0	1103863	-1659834	9	-12	2	118	0	15	-12	-1	42	20
2	1	-7	-14	-93	5	-5	1	705406	-2138971	9	-12	3	54	-208	15	-12	0	381	50
2	1	-6	50	-438	5	-5	2	-172814	1284554	9	-12	4	-46	-10	15	-12	1	85	-82
2	1	-5	569	-3101	5	-5	3	-205706	575193	9	-12	5	-6	-18	15	-12	2	-352	-50
2	1	-4	4498	-19936	5	-5	4	-76527	37566	9	-12	7	2	1	15	-12	3	-71	8
2	1	-3	27348	-106005	5	-5	5	-13877	1033	9	-11	-2	4	-3	15	-12	4	-8	1
2	1	-2	55914	-229814	5	-5	6	-2058	-162	9	-11	-1	44	-51	15	-11	-1	-1	-1
2	1	-1	-103844	369360	5	-5	7	-280	-85	9	-11	0	422	-446	15	-11	0	-9	13
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2	1	3	-120	397	5	-4	-6	5	2	9	-11	4	44	-224	15	-10	-1	-0	1
2	1	4	-36	46	5	-4	-5	42	16	9	-11	5	28	-21	15	-10	0	-1	0
2	1	5	26	19	5	-4	-4	380	169	9	-11	6	-4	-2	15	-10	1	0	-1
2	1	6	16	-24	5	-4	-3	3553	1590	9	-11	7	-3	3	15	-10	2	1	-0
2	1	7	5	9	5	-4	-2	35224	15698	9	-10	-5	7	7	15	-9	-1	1	1
2	1	8	-1	6	5	-4	-1	410719	182991	9	-10	-4	64	60	15	-9	0	-6	4
2	2	-13	-3	-3	5	-4	0	6441960	2187950	9	-10	-3	558	515	15	-9	1	5	-10
2	2	-12	-6	-5	5	-4	1	4213501	717128	9	-10	-2	5047	4658	15	-9	2	4	-3
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2	2	-9	15	8	5	-4	4	-182548	-39597	9	-10	1	-70098	-42358	15	-8	0	-2	-5
2	2	-8	14	-27	5	-4	5	-24431	-5084	9	-10	2	-520520	-480272	15	-8	1	13	14
2	2	-7	-80	-11	5	-4	6	-3136	-635	9	-10	3	-24808	-30376	15	-8	2	2	5
2	2	-6	12	-256	5	-4	7	-398	-70	9	-10	4	-1760	-2690	15	-8	3	-4	-5
2	2	-5	281	-1398	5	-4	8	-42	-19	9	-10	5	-165	-260	15	-7	-2	1	1
2	2	-4	2279	-6891	5	-4	9	-9	-2	9	-10	6	-13	-39	15	-7	-1	11	14
2	2	-3	23096	-11062	5	-3	-7	-4	-0	9	-10	7	-2	-2	15	-7	0	3	1
2	2	-2	46256	4786	5	-3	-6	-46	-4	9	-9	-3	-7	1	15	-7	1	-11	-14
2	2	-1	-65676	59900	5	-3	-5	-298	-72	9	-9	-2	-71	18	15	-7	2	-4	-2
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2	2	1	-3546	7904	5	-3	-3	-22414	-5432	9	-9	0	-6631	3635	15	-6	-2	33	4
2	2	2	-315	767	5	-3	-2	-199843	-43827	9	-9	1	-3340	3893	15	-6	-1	-32	3
2	2	3	-38	92	5	-3	-1	-1812868	-271839	9	-9	2	5378	-2958	15	-6	0	-97	3
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2	2	6	-7	-5	5	-3	2	1431230	-576744	9	-9	5	14	-46	15	-5	-2	0	-2
2	2	7	5	7	5	-3	3	190329	-76603	9	-9	6	12	1	15	-5	-1	-2	-3
2	2	9	2	2	5	-3	4	23209	-9263	9	-8	-3	3	-4	15	-5	0	-0	2

Table 1 (Cont.)

6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin
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2	3	-11	9	11	5	-3	6	322	-141	9	-8	-1	160	-416	15	-4	-5	-3	2
2	3	-10	0	-25	5	-3	7	33	-16	9	-8	0	-256	-2594	15	-4	-4	-1	-6
2	3	-9	-44	-42	5	-3	8	5	-1	9	-8	1	-1141	-1318	15	-4	-3	8	7
2	3	-8	-38	-4	5	-3	9	0	-3	9	-8	2	277	1749	15	-4	-2	2	9
2	3	-7	14	-24	5	-2	-9	-3	2	9	-8	3	193	668	15	-4	-1	-15	-28
2	3	-6	-160	-119	5	-2	-8	-26	17	9	-8	4	-2	97	15	-4	0	-15	-4
2	3	-5	-386	-656	5	-2	-7	-211	140	9	-8	5	-16	13	15	-4	2	3	-1
2	3	-4	3046	-740	5	-2	-6	-1774	1127	9	-8	6	-7	0	15	-2	-8	-3	-3
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2	3	4	-27	-41	5	-2	2	-678251	984426	9	-7	3	-418	130	15	-2	2	-3	1
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Table 1 (Cont.)

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2	6	3	-0	2	5	1	-4	-86384	-40229	9	-2	-4	-1365	-440	16	-19	4	-20618	2624
2	7	-12	-3	3	5	1	-3	-104528	-288821	9	-2	-3	-4217	-9430	16	-19	5	-2158	278
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2	7	-8	-43	-44	5	1	0	795171	958620	9	-2	0	14267	49263	16	-19	8	-3	0
2	7	-7	-33	-88	5	1	1	59593	71959	9	-2	1	1214	3705	16	-18	0	5	9
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2	7	0	-5	-4	5	2	-12	-1	1	9	-1	-5	-16	22	16	-17	0	3	2
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Table 1 (Cont.)

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3	-9	9	20	3	5	8	-9	-19	27	10	-9	2	1539	-20	21	10	-2	1	-14
3	-9	10	26	-34	5	8	-8	-57	8	10	-9	3	628	-251	21	10	-1	0	-1
3	-9	11	2	-4	5	8	-7	-29	-43	10	-9	4	143	40	21	11	-5	-2	-1
3	-9	12	1	-2	5	8	-6	16	-22	10	-9	5	-17	14	21	11	-4	-25	-11
3	-8	-3	6	-3	5	8	-5	9	3	10	-9	6	-37	-33	21	11	-2	22	10
3	-8	-2	56	-22	5	8	-4	2	2	10	-9	7	-7	-6	21	11	-1	2	1
3	-8	-1	530	-190	5	8	-3	-3	-1	10	-8	-3	3	2	21	12	-4	4	-5
3	-8	0	5460	-1909	5	9	-14	1	-2	10	-8	-2	-0	-11	21	12	-2	-4	5
3	-8	1	942	2674	5	9	-13	-5	-25	10	-8	-1	67	-162	22	10	-6	-1	2
3	-8	2	-5214	1832	5	9	-12	11	-12	10	-8	0	-858	-944	22	10	-5	-6	18
3	-8	3	199	-115	5	9	-11	16	-2	10	-8	1	-1538	-4	22	10	-4	-60	194
3	-8	4	96	1215	5	9	-10	2	31	10	-8	2	292	42	22	10	-2	61	-196
3	-8	5	-325	838	5	9	-9	-13	35	10	-8	3	492	148	22	10	-1	6	-18

Table 1 (Cont.)

6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin
3	-8	6	-42	14	5	9	-8	-26	-8	10	-8	4	74	62	22	10	0	1	-2
3	-8	7	13	-38	5	9	-7	-2	-19	10	-8	5	64	36	22	16	-5	-6	-3
3	-8	8	25	32	5	9	-6	28	13	10	-8	6	-32	1	22	16	-3	6	3
3	-8	9	6	-6	5	9	-5	10	28	10	-8	7	-2	-1	23	16	-7	-2	-2
3	-8	10	2	-10	5	9	-4	-5	-3	10	-7	-4	2	-1	23	16	-6	-20	-14
3	-8	11	-0	-3	5	9	-3	-3	-5	10	-7	-3	8	-4	23	16	-5	-211	-154
3	-7	-4	7	-2	5	10	-14	7	5	10	-7	-2	-28	-1	23	16	-3	211	154
3	-7	-3	69	-23	5	10	-13	2	14	10	-7	-1	-247	-51	23	16	-2	20	14
3	-7	-2	622	-198	5	10	-12	-10	-3	10	-7	0	-3472	-2792	23	16	-1	2	2
3	-7	-1	6042	-1925	5	10	-11	12	42	10	-7	1	-4601	-2705	25	15	-5	-2	2
3	-7	0	67963	-21890	5	10	-10	-9	56	10	-7	2	2481	1142	25	15	-3	2	-2

Table 2. Fourier representation of δy_{2mjk} (periodic part). The coefficients are in units of 10^{-13}

6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin
0	0	0	-30	0	3	-7	-2	-198	-622	5	10	-13	14	-2	10	-7	0	-2735	3518
0	0	1	-84	-4289	3	-7	-1	-1929	-6036	5	10	-12	12	-6	10	-7	1	-2262	4534
0	0	2	-7	-622	3	-7	0	-21850	-67828	5	10	-11	-39	45	10	-7	2	-1599	949
0	0	3	7	-74	3	-7	1	-25526	-9849	5	10	-10	-75	2	10	-7	3	-676	1152
0	0	4	0	-12	3	-7	2	-17950	-66249	5	10	-9	-22	-68	10	-7	4	-139	121
0	0	5	-1	3	3	-7	3	-5841	-12665	5	10	-8	49	-32	10	-7	5	-20	-4
0	0	6	0	2	3	-7	4	1980	-3433	5	10	-7	-3	-9	10	-7	6	-8	-9
0	1	-9	-6	-6	3	-7	5	324	-764	5	10	-6	11	-4	10	-7	7	-2	-2
0	1	-8	-8	-7	3	-7	6	208	-182	5	10	-5	1	-1	10	-6	-4	4	2
0	1	-6	79	73	3	-7	7	34	-34	5	11	-15	0	-3	10	-6	-3	7	-3
0	1	-5	490	381	3	-7	8	-0	8	5	11	-14	6	-8	10	-6	-2	-38	-21
0	1	-4	3564	2637	3	-7	9	21	-19	5	11	-13	11	-13	10	-6	-1	-358	-430
0	1	-3	22945	16511	3	-7	10	4	-4	5	11	-12	11	1	10	-6	0	-7528	-7082
0	1	-2	84142	57250	3	-6	-4	-2	-9	5	11	-11	-8	18	10	-6	1	-4624	-2920
0	1	-1	75464	62837	3	-6	-3	-19	-85	5	11	-10	5	7	10	-6	2	-3212	-3126
0	1	0	219353	148315	3	-6	-2	-175	-789	5	11	-9	-6	8	10	-6	3	-1357	-1004
0	1	1	22498	20232	3	-6	-1	-1739	-7937	5	11	-8	-3	-1	10	-6	4	-207	-151
0	1	2	1839	1897	3	-6	0	-21100	-96914	5	11	7	-20	6	10	-6	5	-41	-19
0	1	3	169	193	3	-6	1	-46531	-66724	5	11	8	-16	-21	10	-6	6	-6	-2
0	1	4	41	47	3	-6	2	-5941	-94641	5	11	9	27	-23	10	-5	-5	4	2
0	1	5	-7	5	3	-6	3	-6345	-39328	5	11	10	12	16	10	-5	-4	-0	12
0	1	6	-1	1	3	-6	4	-1169	-7492	5	11	11	-10	15	10	-5	-3	69	50
0	2	-10	2	2	3	-6	5	511	-2251	5	12	-14	2	-4	10	-5	-2	406	244
0	2	-9	-0	3	3	-6	6	109	-397	5	12	-13	4	1	10	-5	-1	3986	2208
0	2	-8	-23	19	3	-6	7	46	-82	5	12	-12	2	0	10	-5	0	5107	-159
0	2	-7	-33	-57	3	-6	8	2	-11	5	12	-11	3	1	10	-5	1	4251	2595
0	2	-6	-30	4	3	-6	11	0	-1	5	12	-10	-1	3	10	-5	2	2349	132
0	2	-5	-104	-93	3	-5	-5	-0	-2	5	12	-9	-1	1	10	-5	3	262	-9
0	2	-4	-526	757	3	-5	-4	-9	-24	5	12	-8	-1	-1	10	-5	4	37	0
0	2	-3	-8868	-924	3	-5	-3	-48	-241	6	-15	-1	-1	1	10	-5	5	7	-0
0	2	-2	-11068	7964	3	-5	-2	-433	-2182	6	-15	0	-6	11	10	-4	-6	3	-1
0	2	-1	-32558	6047	3	-5	-1	-4291	-22709	6	-15	1	-60	118	10	-4	-5	22	-9
0	2	0	-43285	11736	3	-5	0	-51995	-295192	6	-15	3	-60	118	10	-4	-4	196	-36
0	2	1	-5897	1202	3	-5	1	-73617	-286539	6	-15	4	-6	11	10	-4	-3	1531	-281
0	2	2	-582	106	3	-5	2	-43734	-252032	6	-15	5	-1	1	10	-4	-2	10637	-1852
0	2	3	-61	13	3	-5	3	-21357	-86331	6	-14	2	1	-0	10	-4	-1	-13093	6746
0	2	4	-26	0	3	-5	4	-5023	-23083	6	-14	4	1	-0	10	-4	0	34324	-6458
0	2	5	6	-0	3	-5	5	-856	-3694	6	-14	5	1	-1	10	-4	1	-10178	6057
0	2	6	-1	0	3	-5	6	-111	-483	6	-14	6	1	2	10	-4	2	-1345	893
0	3	-7	2	-5	3	-5	7	-0	-45	6	-14	7	1	-1	10	-4	3	-157	107
0	3	-6	-28	7	3	-5	8	-9	-18	6	-14	8	1	2	10	-4	4	-14	8
0	3	-5	10	-40	3	-5	9	-1	-3	6	-13	3	-2	-4	10	-3	-6	-2	1
0	3	-4	-110	-160	3	-4	-6	0	1	6	-13	4	5	-7	10	-3	-5	2	-8
0	3	-3	849	-2156	3	-4	-5	-8	-6	6	-13	5	-3	7	10	-3	-4	40	-39
0	3	-2	-3056	-1893	3	-4	-4	-51	-30	6	-13	6	-4	5	10	-3	-3	61	-303
0	3	-1	3402	-7851	3	-4	-3	-438	-297	6	-13	7	-4	-2	10	-3	-2	286	-2006
0	3	0	117	-7046	3	-4	-2	-4161	-2785	6	-13	8	-4	7	10	-3	-1	-402	-104
0	3	1	-144	-569	3	-4	-1	-42895	-29691	6	-13	9	-3	-2	10	-3	0	732	-5078
0	3	2	-19	-55	3	-4	0	-492322	-413946	6	-12	0	3	-2	10	-3	1	-372	-382
0	3	3	-3	-8	3	-4	1	-586474	-497317	6	-12	1	-6	8	10	-3	2	-23	-35
0	3	4	-7	-1	3	-4	2	-227871	-185648	6	-12	2	15	-4	10	-3	3	-8	-4
0	3	5	5	3	3	-4	3	-149499	-128469	6	-12	3	-11	32	10	-3	4	3	-1
0	3	6	6	3	3	-4	4	-23244	-19553	6	-12	4	-3	-24	10	-3	5	2	-0
0	4	-8	-3	3	3	-4	5	-3049	-2473	6	-12	5	4	-5	10	-2	-10	-2	-0
0	4	-7	-15	17	3	-4	6	-395	-313	6	-12	6	-5	-1	10	-2	-9	-2	-3
0	4	-6	-1	-4	3	-4	7	-26	-17	6	-12	7	2	-15	10	-2	-8	-34	-3
0	4	-5	25	-11	3	-4	8	-6	-3	6	-12	8	5	0	10	-2	-7	-3	8
0	4	-4	43	-167	3	-3	-7	1	-2	6	-12	9	0	-5	10	-2	-6	-9	-6
0	4	-3	433	587	3	-3	-6	3	-9	6	-11	-1	1	1	10	-2	-5	76	9
0	4	-2	169	-1503	3	-3	-5	-17	-5	6	-11	0	2	9	10	-2	-4	-264	529
0	4	-1	2392	100	3	-3	-4	-92	-46	6	-11	1	-42	4	10	-2	-3	-126	-450
0	4	0	1318	-788	3	-3	-3	-947	-402	6	-11	2	36	68	10	-2	-2	952	6239

Table 2 (Cont.)

6	5	4	cos	sin
0	4	1	86	-55
0	4	2	7	-7
0	4	3	-2	-0
0	4	4	2	0
0	5	-8	1	3
0	5	-7	1	40
0	5	-6	18	13
0	5	-5	-18	5
0	5	-4	116	105
0	5	-3	-103	110
0	5	-2	403	-213
0	5	-1	326	468
0	5	0	377	61
0	5	1	31	5
0	5	2	3	1
0	6	-9	2	5
0	6	-8	16	26
0	6	-7	55	71
0	6	-6	-49	4
0	6	-5	56	6
0	6	-4	-53	41
0	6	-3	-1	4
0	6	-2	389	110
0	6	-1	-89	250
0	6	0	368	136
0	6	1	31	17
0	6	2	3	2
0	7	-9	-5	-2
0	7	-8	22	8
0	7	-7	-14	18
0	7	-6	11	-10
0	7	-5	-15	26
0	7	-4	-37	-4
0	7	-3	42	1
0	7	-2	44	-33
0	7	-1	19	2
0	7	0	19	-8
0	7	1	2	-2
0	8	-9	-10	4
0	8	-8	2	-10
0	8	-7	-5	10
0	8	-6	13	-1
0	8	-5	22	-11
0	8	-4	-7	13
0	8	-3	-3	-1
0	9	-9	-5	-1
0	9	-8	1	-4
0	9	-7	-5	-1
0	9	-6	-2	-3
0	9	-4	-3	1
1	-13	1	-7	-3
1	-13	3	-7	-3
1	-13	8	-1	-2
1	-13	9	1	-3
1	-13	10	3	-0
1	-13	11	1	-3
1	-13	12	4	1
1	-12	6	-5	11
1	-12	7	-18	-2
1	-12	8	2	-15
1	-12	9	-18	1
1	-12	10	8	-5
1	-12	11	1	-1

6	5	4	cos	sin
3	-3	-2	-7486	-3473
3	-3	-1	-53063	-25061
3	-3	0	563061	39488
3	-3	1	-81410	-20592
3	-3	2	241652	15266
3	-3	3	39654	5323
3	-3	4	5209	877
3	-3	5	652	161
3	-3	6	88	56
3	-3	7	14	1
3	-3	8	1	7
3	-3	9	-2	4
3	-2	-8	-5	-2
3	-2	-7	4	2
3	-2	-6	-13	-20
3	-2	-5	-86	64
3	-2	-4	-743	624
3	-2	-3	-6009	4765
3	-2	-2	-56633	42499
3	-2	-1	-636608	389803
3	-2	0	-191426	-1262883
3	-2	1	-775407	241330
3	-2	2	-139789	-421626
3	-2	3	-29110	-111039
3	-2	4	-4185	-16772
3	-2	5	-583	-2191
3	-2	6	-52	-297
3	-2	7	-52	4
3	-2	8	5	-23
3	-2	9	-7	11
3	-2	10	4	-7
3	-1	-9	-0	-2
3	-1	-8	-3	-0
3	-1	-7	-17	-11
3	-1	-6	-53	45
3	-1	-5	-438	771
3	-1	-4	-2994	6139
3	-1	-3	-22471	48502
3	-1	-2	-137598	329531
3	-1	-1	155719	-90328
3	-1	0	-436933	969181
3	-1	1	132991	-26901
3	-1	2	16218	-8882
3	-1	3	1864	-1178
3	-1	4	201	-105
3	-1	5	-6	14
3	-1	6	-0	-2
3	-1	7	-9	-21
3	-1	8	0	14
3	-1	9	-1	-4
3	-1	10	0	6
3	0	-8	-1	1
3	0	-7	-2	1
3	0	-6	6	133
3	0	-5	228	639
3	0	-4	1487	4142
3	0	-3	9777	25340
3	0	-2	31650	96490
3	0	-1	39905	72959
3	0	0	81185	238326
3	0	1	12741	18010
3	0	2	1338	1532
3	0	3	164	169

6	5	4	cos	sin
6	-11	3	-61	70
6	-11	4	-26	-20
6	-11	5	12	32
6	-11	6	-61	2
6	-11	7	17	-23
6	-11	8	-12	15
6	-11	9	-5	-10
6	-10	-3	-0	-1
6	-10	-2	-0	-1
6	-10	-1	11	28
6	-10	0	60	246
6	-10	1	-699	-376
6	-10	2	154	765
6	-10	3	-463	-78
6	-10	4	-3	19
6	-10	5	1	66
6	-10	6	-3	-8
6	-10	7	29	8
6	-10	8	14	1
6	-10	9	-4	-2
6	-9	-4	2	7
6	-9	-3	17	57
6	-9	-2	155	516
6	-9	-1	1451	4875
6	-9	0	15030	50770
6	-9	1	-17151	-21239
6	-9	2	16713	56777
6	-9	3	-4390	-2625
6	-9	4	-694	-309
6	-9	5	-66	-56
6	-9	6	-24	-29
6	-9	7	65	-7
6	-9	8	-3	2
6	-9	9	-1	0
6	-8	-4	0	4
6	-8	-3	4	44
6	-8	-2	30	397
6	-8	-1	208	3853
6	-8	0	2070	44546
6	-8	1	10818	44672
6	-8	2	-507	34101
6	-8	3	3681	16799
6	-8	4	349	2110
6	-8	5	51	258
6	-8	6	34	9
6	-8	7	23	-21
6	-8	8	6	-6
6	-7	-3	-20	-0
6	-7	-2	-214	-53
6	-7	-1	-2258	-527
6	-7	0	-30866	-5526
6	-7	1	-31629	1674
6	-7	2	-19049	-5951
6	-7	3	-10524	-285
6	-7	4	-1415	-240
6	-7	5	-160	-48
6	-7	6	-18	-25
6	-7	7	-5	-8
6	-7	8	-0	-2
6	-6	-4	2	-2
6	-6	-3	33	-29
6	-6	-2	272	-244
6	-6	-1	2383	-2472

6	5	4	cos	sin
10	-2	-1	-3057	4027
10	-2	0	-2441	7253
10	-2	1	-178	543
10	-2	2	-14	51
10	-2	3	5	3
10	-2	4	1	-0
10	-1	-7	11	-2
10	-1	-6	16	16
10	-1	-5	20	-10
10	-1	-4	109	103
10	-1	-3	6	387
10	-1	-2	1134	1074
10	-1	-1	-111	1522
10	-1	0	553	1617
10	-1	1	32	115
10	-1	2	3	12
10	-1	3	-3	-4
10	0	-7	3	-1
10	0	-6	39	-4
10	0	-5	1	-2
10	0	-4	32	35
10	0	-3	91	10
10	0	-2	202	333
10	0	-1	-190	197
10	0	0	18	278
10	0	1	2	23
10	0	2	-3	0
10	1	-7	14	-14
10	1	-6	45	-45
10	1	-5	15	0
10	1	-4	37	-23
10	1	-3	34	12
10	1	-2	0	69
10	1	-1	-34	2
10	1	0	-9	54
10	1	1	3	2
10	1	2	-1	-3
10	2	-8	-1	4
10	2	-7	1	-23
10	2	-6	16	-2
10	2	-5	-2	-3
10	2	-4	15	-7
10	2	-3	9	36
10	2	-2	-11	75
10	2	-1	-7	-8
10	2	0	-8	73
10	2	1	0	6
10	3	-8	6	9
10	3	-7	-2	-3
10	3	-6	5	7
10	3	-5	0	6
10	3	-4	-13	-4
10	3	-3	1	-3
10	4	-9	3	1
10	4	-8	1	5
10	4	-6	1	5
10	4	-5	-3	-0
10	21	-7	1	0
10	21	-6	10	3
10	21	-5	105	35
10	21	-3	110	36
10	21	-2	10	3
10	21	-1	1	0

Table 2 (Cont.)

6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin
1	-12	12	7	5	3	0	4	22	17	6	-6	0	5083	-28578	11	-19	1	-2	-0
1	-11	3	1	-0	3	0	5	-5	-5	6	-6	1	1335	-24654	11	-19	3	-2	-0
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1	-11	10	-8	23	3	1	-5	-41	184	6	-5	-5	-1	1	11	-17	0	291	135
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1	-11	12	7	2	3	1	-3	-14890	-4972	6	-5	-3	-26	89	11	-17	2	100	2
1	-10	1	5	-2	3	1	-2	-12266	67	6	-5	-2	-176	708	11	-17	3	3058	1387
1	-10	2	4	1	3	1	-1	-55558	-24107	6	-5	-1	-906	5279	11	-17	4	315	125
1	-10	3	-3	-0	3	1	0	-61614	-17141	6	-5	0	-8840	3933	11	-17	5	34	13
1	-10	4	17	-2	3	1	1	-4385	-1195	6	-5	1	-15688	1813	11	-17	6	3	1
1	-10	5	6	-7	3	1	2	-401	-98	6	-5	2	-3523	2627	11	-16	1	-7	1
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1	-10	7	-8	14	3	1	4	-28	4	6	-5	4	-567	-191	11	-15	0	-2	-2
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1	-9	4	4	-28	3	2	-6	-1	-45	6	-4	-1	-10176	-2076	11	-14	5	6	5
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1	-9	8	-18	9	3	2	-2	-12660	-2118	6	-4	3	418	-211	11	-13	2	-56	51
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1	-8	0	-11	-9	3	2	4	-18	14	6	-3	-4	14	19	11	-12	0	-189	65
1	-8	1	-23	-29	3	2	5	28	-18	6	-3	-3	149	85	11	-12	1	1147	-738
1	-8	2	-50	7	3	2	6	-3	2	6	-3	-2	533	1269	11	-12	2	-388	105
1	-8	3	-56	-109	3	2	7	2	-1	6	-3	-1	-15869	21088	11	-12	3	402	-273
1	-8	4	141	-139	3	3	-11	1	-1	6	-3	0	5652	-1117	11	-12	4	54	-57
1	-8	5	277	93	3	3	-10	5	-2	6	-3	1	-16590	22824	11	-12	5	3	-11
1	-8	6	14	186	3	3	-9	28	-14	6	-3	2	-1948	2579	11	-11	-4	-1	-2
1	-8	7	20	33	3	3	-8	40	-18	6	-3	3	-212	290	11	-11	-3	-3	-15
1	-8	8	24	20	3	3	-7	111	-71	6	-3	4	-32	15	11	-11	-2	-26	-135
1	-8	9	7	25	3	3	-6	109	-49	6	-3	5	-3	5	11	-11	-1	-213	-1282
1	-8	10	3	27	3	3	-5	60	-47	6	-3	6	-4	-5	11	-11	0	-1436	-13666
1	-8	11	0	2	3	3	-4	535	-944	6	-2	-7	-5	4	11	-11	1	1817	5471
1	-8	12	0	2	3	3	-3	-73	614	6	-2	-6	-35	84	11	-11	2	-1671	-14919
1	-7	-3	-5	-4	3	3	-2	-2591	-2516	6	-2	-5	30	556	11	-11	3	548	470
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1	-7	-1	-373	-328	3	3	0	-985	-2610	6	-2	-3	925	32010	11	-11	5	15	15
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1	-7	1	294	-1754	3	3	2	-11	-18	6	-2	-1	153178	134582	11	-10	-3	3	2
1	-7	2	-4544	-3618	3	3	3	2	-3	6	-2	0	22613	593318	11	-10	-2	25	17
1	-7	3	-238	-1676	3	3	4	-7	0	6	-2	1	148029	156262	11	-10	-1	264	159
1	-7	4	942	-361	3	3	5	1	-1	6	-2	2	18986	17050	11	-10	0	2402	568
1	-7	5	429	549	3	4	-10	-2	4	6	-2	3	2195	1880	11	-10	1	1443	166
1	-7	6	105	45	3	4	-9	4	-22	6	-2	4	254	216	11	-10	2	1992	538
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1	-7	9	43	41	3	4	-6	14	-49	6	-1	-8	-3	1	11	-10	5	10	4
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Table 2 (Cont.)

6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin
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1	-6	-3	-6	-10	3	4	-3	-272	65	6	-1	-5	21	12	11	-9	-1	-127	58
1	-6	-2	-101	-82	3	4	-2	-258	-823	6	-1	-4	-100	53	11	-9	0	-235	382
1	-6	-1	-878	-824	3	4	-1	553	-196	6	-1	-3	231	-1016	11	-9	1	-292	372
1	-6	0	-9627	-9348	3	4	0	-89	-657	6	-1	-2	-1097	156	11	-9	2	-207	252
1	-6	1	-6442	4636	3	4	1	-4	-51	6	-1	-1	-310	-3322	11	-9	3	-47	129
1	-6	2	-9762	-10890	3	4	2	7	-6	6	-1	0	-1046	-4627	11	-9	4	-10	8
1	-6	3	-54	-2666	3	4	3	1	-0	6	-1	1	-103	-391	11	-9	5	-2	1
1	-6	4	2285	857	3	4	4	-2	-0	6	-1	2	-18	-38	11	-8	-3	-1	-3
1	-6	5	330	-247	3	5	-12	-1	-2	6	-1	3	1	-3	11	-8	-2	-6	0
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1	-6	7	44	7	3	5	-10	3	9	6	0	-7	-2	-3	11	-8	0	-154	-119
1	-6	8	41	0	3	5	-9	-12	-29	6	0	-6	4	-14	11	-8	1	-181	-168
1	-6	9	22	4	3	5	-8	-19	-20	6	0	-5	-64	47	11	-8	2	-98	-90
1	-6	10	2	-1	3	5	-7	-15	-24	6	0	-4	13	29	11	-8	3	-65	-19
1	-5	-3	-20	-22	3	5	-6	-30	-58	6	0	-3	-74	310	11	-8	4	-15	0
1	-5	-2	-173	-222	3	5	-5	49	10	6	0	-2	472	803	11	-7	-3	1	5
1	-5	-1	-1607	-2250	3	5	-4	-31	53	6	0	-1	-500	1130	11	-7	-2	4	-5
1	-5	0	-19746	-27738	3	5	-3	64	-399	6	0	0	-103	1495	11	-7	-1	74	40
1	-5	1	-32435	-4216	3	5	-2	-429	-5010	6	0	1	-9	77	11	-7	0	57	18
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1	-4	2	17254	-144886	3	7	-11	8	-1	6	2	-4	11	-15	11	-5	2	15	18
1	-4	3	-28598	-40337	3	7	-10	-21	8	6	2	-3	35	40	11	-5	3	1	2
1	-4	4	710	-12810	3	7	-9	18	-19	6	2	-2	-35	56	11	-4	-4	10	6
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1	-4	8	8	-16	3	7	-5	22	31	6	3	-8	-1	5	11	-4	0	941	465
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1	-3	-8	-5	-2	3	7	-2	0	6	6	3	-5	-12	-21	11	-4	3	-3	-4
1	-3	-7	29	11	3	8	-11	4	-3	6	3	-4	12	-16	11	-3	-5	0	-5
1	-3	-6	-20	-14	3	8	-10	-2	-12	6	3	-3	1	9	11	-3	-4	12	1
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1	-3	-4	-5	-67	3	8	-8	-22	-11	6	3	-1	-5	-4	11	-3	-2	14	23
1	-3	-3	-17	-469	3	8	-7	-18	-6	6	3	0	-6	2	11	-3	-1	-42	52
1	-3	-2	59	-4404	3	8	-6	-14	12	6	4	-9	2	1	11	-3	0	-21	70
1	-3	-1	1122	-48048	3	8	-5	-17	-12	6	4	-8	-6	1	11	-3	1	-8	4
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1	-3	5	-46	-3494	3	9	-9	2	1	6	4	-2	-33	21	11	-2	-6	-30	26
1	-3	6	49	-458	3	9	-8	-4	6	6	4	-1	-4	5	11	-2	-5	49	17
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Table 2 (Cont.)

6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin
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1	-3	9	13	2	3	10	-10	-1	-1	6	5	-9	3	-0	11	-2	-2	-210	727
1	-3	10	-3	1	3	10	-8	-1	-1	6	5	-8	2	3	11	-2	-1	-1056	-494
1	-3	11	3	0	4	-14	6	-2	1	6	5	-7	1	-0	11	-2	0	-1039	-94
1	-2	-11	3	3	4	-14	7	-3	-2	6	5	-6	3	2	11	-2	1	-76	-7
1	-2	-10	-3	-3	4	-14	8	0	-4	6	5	-5	-5	1	11	-2	2	-9	2
1	-2	-9	18	17	4	-14	9	-1	-3	6	5	-4	1	-1	11	-1	-5	-1	1
1	-2	-8	-3	-2	4	-14	10	2	-5	6	5	-3	-16	5	11	-1	-1	1	-1
1	-2	-7	19	17	4	-14	11	2	-1	6	5	-1	-3	1	11	0	-3	-0	-1
1	-2	-6	-26	-21	4	-13	4	4	-0	6	6	-6	-2	1	11	0	-1	-0	-1
1	-2	-5	-9	16	4	-13	5	0	4	6	6	-4	4	-3	11	20	-5	-0	8
1	-2	-4	-79	23	4	-13	6	3	-2	7	-16	1	2	2	11	20	-3	-0	8
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1	-2	-2	-3792	3374	4	-13	8	14	-4	7	-15	1	-2	3	11	21	-6	23	24
1	-2	-1	-25721	35902	4	-13	9	3	6	7	-15	3	-2	3	11	21	-5	243	253
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1	-2	1	-122946	-25800	4	-13	11	4	4	7	-14	5	1	-1	11	21	-2	23	24
1	-2	2	89233	97271	4	-12	2	3	3	7	-14	6	-2	2	11	21	-1	2	2
1	-2	3	-6531	4980	4	-12	3	-0	-1	7	-14	7	1	-1	12	-19	1	-9	-6
1	-2	4	1148	-284	4	-12	4	2	13	7	-14	8	1	2	12	-19	3	-12	-8
1	-2	5	217	-22	4	-12	5	35	-17	7	-13	2	0	-14	12	-18	-1	1	-2
1	-2	6	-14	-11	4	-12	6	16	29	7	-13	3	-10	-1	12	-18	0	10	-16
1	-2	7	20	-25	4	-12	7	3	-3	7	-13	4	1	-20	12	-18	1	102	-156
1	-2	8	4	21	4	-12	8	-12	-16	7	-13	5	5	-3	12	-18	3	116	-177
1	-2	9	13	4	4	-12	9	-4	25	7	-13	6	-9	-4	12	-18	4	10	-16
1	-2	10	-17	-9	4	-12	10	6	-6	7	-13	7	8	-4	12	-18	5	1	-2
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1	-2	12	-2	-0	4	-11	1	-1	0	7	-13	9	-1	-2	12	-17	1	31	73
1	-1	-9	-5	-1	4	-11	2	1	4	7	-12	-1	-3	1	12	-17	3	29	67
1	-1	-8	-2	-15	4	-11	3	-6	-6	7	-12	0	4	2	12	-17	4	2	6
1	-1	-7	-9	-16	4	-11	4	24	-16	7	-12	1	-40	29	12	-16	0	-2	1
1	-1	-6	-24	-27	4	-11	5	20	19	7	-12	2	41	1	12	-16	1	-29	16
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1	-1	-3	-14195	-3214	4	-11	8	-11	55	7	-12	5	21	-2	12	-15	0	-3	1
1	-1	-2	-124334	-26440	4	-11	9	-30	24	7	-12	6	0	20	12	-15	1	-64	30
1	-1	-1	-1032425	-157457	4	-11	10	12	2	7	-12	7	10	-18	12	-15	2	24	-1
1	-1	0	-100702	20160	4	-11	11	5	-2	7	-12	8	-1	-4	12	-15	3	-44	20
1	-1	1	-1143039	-181209	4	-10	0	-4	-3	7	-12	9	5	-2	12	-15	4	3	1
1	-1	2	-111398	6350	4	-10	1	-5	-25	7	-11	-1	6	-0	12	-14	-1	1	0
1	-1	3	-11674	1658	4	-10	2	-47	3	7	-11	0	37	11	12	-14	0	-9	4
1	-1	4	-1361	205	4	-10	3	-13	-90	7	-11	1	-230	178	12	-14	1	-183	68
1	-1	5	-155	26	4	-10	4	81	-75	7	-11	2	292	64	12	-14	2	8	40
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1	-1	7	-18	27	4	-10	6	10	12	7	-11	4	36	-18	12	-14	4	-13	17
1	-1	8	-20	18	4	-10	7	-10	16	7	-11	5	53	82	12	-14	5	2	5
1	-1	9	-3	5	4	-10	8	22	5	7	-11	6	-40	-10	12	-13	-1	1	4
1	-1	10	-8	7	4	-10	9	-35	53	7	-11	7	13	-1	12	-13	0	-3	11
1	-1	11	6	-1	4	-10	10	3	-4	7	-11	8	-13	11	12	-13	1	-193	-512
1	0	-8	5	-7	4	-9	-2	-3	-2	7	-11	9	2	-9	12	-13	2	-17	77
1	0	-7	-17	0	4	-9	-1	-26	-17	7	-10	-3	3	-0	12	-13	3	-60	-205
1	0	-6	7	-9	4	-9	0	-227	-176	7	-10	-2	21	-1	12	-13	4	-22	-32
1	0	-5	-190	134	4	-9	1	286	-437	7	-10	-1	187	4	12	-13	5	-4	-0
1	0	-4	-1638	1032	4	-9	2	-660	-346	7	-10	0	1748	26	12	-12	-2	-5	2
1	0	-3	-13114	8058	4	-9	3	183	-629	7	-10	1	-3974	1574	12	-12	-1	-48	5
1	0	-2	-95211	60114	4	-9	4	364	-45	7	-10	2	2912	294	12	-12	0	-454	-54
1	0	-1	-11965	87770	4	-9	5	-12	131	7	-10	3	-1395	547	12	-12	1	1058	-126
1	0	0	-266780	160175	4	-9	6	25	12	7	-10	4	-70	155	12	-12	2	-651	-69
1	0	1	-31877	93078	4	-9	7	13	27	7	-10	5	18	60	12	-12	3	322	-65
1	0	2	-3495	12981	4	-9	8	11	8	7	-10	6	-16	-6	12	-12	4	51	-16
1	0	3	-342	1452	4	-9	9	7	43	7	-10	7	10	32	12	-12	5	5	-2
1	0	4	-96	208	4	-9	10	-0	3	7	-10	8	-8	-19	12	-11	-4	2	-3
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Table 2 (Cont.)

6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin
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1	0	7	-2	6	4	-8	-4	-64	-49	7	-9	-4	55	9	12	-11	-1	1308	-2455
1	0	8	1	-2	4	-8	-3	-555	-424	7	-9	-3	484	79	12	-11	0	11985	-26276
1	1	-12	-0	1	4	-8	-2	-5024	-3841	7	-9	-2	4396	724	12	-11	1	1076	-4180
1	1	-11	-2	13	4	-8	-1	-47821	-36626	7	-9	-1	42156	6991	12	-11	2	11656	-25221
1	1	-10	-4	-6	4	-8	0	-509051	-390575	7	-9	0	459046	76869	12	-11	3	1261	-3718
1	1	-9	-10	44	4	-8	1	66423	-22151	7	-9	1	116164	-2171	12	-11	4	138	-436
1	1	-8	-32	40	4	-8	2	-524566	-397906	7	-9	2	437521	75490	12	-11	5	15	-51
1	1	-7	-6	7	4	-8	3	-24519	-45120	7	-9	3	79291	6280	12	-11	6	2	-6
1	1	-6	-57	47	4	-8	4	-1747	-4521	7	-9	4	9651	741	12	-10	-2	5	8
1	1	-5	-77	570	4	-8	5	31	-566	7	-9	5	1124	118	12	-10	-1	32	93
1	1	-4	-707	4351	4	-8	6	50	-65	7	-9	6	142	-17	12	-10	0	320	305
1	1	-3	-4805	29471	4	-8	7	9	3	7	-9	7	55	28	12	-10	1	263	247
1	1	-2	-9532	54321	4	-8	8	41	42	7	-9	8	-5	1	12	-10	2	236	256
1	1	-1	-20876	107429	4	-8	9	4	3	7	-8	-4	-1	1	12	-10	3	104	57
1	1	0	-29338	151205	4	-8	10	5	3	7	-8	-3	-7	15	12	-10	4	8	4
1	1	1	-6821	12493	4	-8	11	1	1	7	-8	-2	-62	141	12	-9	-3	-0	-3
1	1	2	-754	1206	4	-7	-4	-4	-4	7	-8	-1	-642	1475	12	-9	-2	-2	1
1	1	3	-98	101	4	-7	-3	-36	-38	7	-8	0	-7320	19588	12	-9	-1	-53	-10
1	1	4	5	43	4	-7	-2	-352	-383	7	-8	1	-3260	19288	12	-9	0	-107	45
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1	1	7	-4	-8	4	-7	1	-50916	-17026	7	-8	4	-150	856	12	-9	3	-34	22
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1	2	-2	16547	61021	4	-6	0	-34212	-100307	7	-7	6	29	-54	12	-7	0	42	43
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1	2	0	24247	87040	4	-6	2	808	-65192	7	-7	8	0	-1	12	-7	2	23	23
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1	2	9	3	2	4	-5	-3	120	-78	7	-6	4	400	-784	12	-6	3	1	-0
1	3	-12	-1	-1	4	-5	-2	1170	-731	7	-6	5	69	-136	12	-5	-3	7	-11
1	3	-11	-4	-10	4	-5	-1	12565	-7999	7	-6	6	3	-26	12	-5	-2	33	-53
1	3	-10	-11	-11	4	-5	0	177944	-125872	7	-6	7	3	-11	12	-5	-1	-15	80
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1	3	-2	7787	16019	4	-5	8	2	-7	7	-5	2	-2219	2184	12	-4	-1	142	518
1	3	-1	-1475	13641	4	-4	-5	-8	6	7	-5	3	-1264	-880	12	-4	0	464	1764
1	3	0	4648	17427	4	-4	-4	-46	14	7	-5	4	-202	-179	12	-4	1	58	132
1	3	1	368	1341	4	-4	-3	-348	158	7	-5	5	-35	-27	12	-4	2	9	3
1	3	2	51	115	4	-4	-2	-3026	1295	7	-5	6	-7	-6	12	-4	3	2	-4

Table 2 (Cont.)

6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin
1	3	3	32	-10	4	-4	-1	-26662	12381	7	-4	-5	-5	-1	12	-3	-5	-2	3
1	3	4	-4	-11	4	-4	0	-64290	-5057	7	-4	-4	-12	-23	12	-3	-4	6	2
1	3	5	-11	-29	4	-4	1	-70451	-81702	7	-4	-3	-93	-240	12	-3	-3	18	11
1	3	6	6	-1	4	-4	2	-32153	4450	7	-4	-2	-1157	-1460	12	-3	-2	13	-4
1	3	7	-3	-1	4	-4	3	-11514	-19858	7	-4	-1	-9247	-8589	12	-3	-1	54	35
1	4	-10	2	-1	4	-4	4	-1756	-3341	7	-4	0	2490	-1193	12	-3	0	30	12
1	4	-9	11	-3	4	-4	5	-234	-513	7	-4	1	-12095	-10471	12	-3	1	2	-0
1	4	-8	-5	-2	4	-4	6	-45	-47	7	-4	2	401	-524	12	-3	2	-1	5
1	4	-7	100	-35	4	-4	7	-7	-16	7	-4	3	-91	-33	12	-2	-10	0	-2
1	4	-6	25	79	4	-4	8	-1	-3	7	-4	4	-20	-15	12	-2	-9	-3	-3
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1	4	1	13	277	4	-3	0	63730	16589	7	-3	-2	6153	867	12	-2	-2	-57	124
1	4	2	12	46	4	-3	1	-70202	-128440	7	-3	-1	-12420	2647	12	-2	-1	-143	-127
1	4	3	-15	-12	4	-3	2	20705	3250	7	-3	0	21584	2466	12	-2	0	-129	-37
1	4	4	1	13	4	-3	3	3077	1019	7	-3	1	-10904	2875	12	-2	1	-8	-2
1	4	5	-5	-1	4	-3	4	472	71	7	-3	2	-1373	448	12	20	-6	-2	7
1	4	6	1	-4	4	-3	5	59	10	7	-3	3	-134	69	12	20	-5	-24	74
1	5	-10	2	1	4	-3	6	8	0	7	-3	4	-26	1	12	20	-3	-27	81
1	5	-9	33	-15	4	-3	7	1	1	7	-3	5	-1	4	12	20	-2	-2	7
1	5	-8	14	-23	4	-3	8	-0	-3	7	-3	6	-7	-2	12	21	-6	3	10
1	5	-7	18	15	4	-2	-8	-0	-1	7	-2	-8	-7	5	12	21	-5	34	102
1	5	-6	20	5	4	-2	-7	7	-4	7	-2	-7	-49	25	12	21	-3	29	89
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1	5	-4	475	31	4	-2	-5	268	26	7	-2	-5	-2063	1339	12	22	-5	-0	2
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1	7	-12	-0	-2	4	-1	0	-177832	-56859	7	-1	4	4	-1	13	-16	3	2	40
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1	7	-3	5	12	4	0	-8	5	2	7	0	1	-13	96	13	-14	-1	1	0
1	7	-2	-3	5	4	0	-7	-0	12	7	0	2	-2	10	13	-14	0	-8	3
1	7	-1	-1	2	4	0	-6	50	66	7	0	3	-1	-5	13	-14	1	-244	49

Table 2 (Cont.)

6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin
1	7	0	-2	-0	4	0	-5	-16	212	7	1	-7	2	7	13	-14	2	12	21
1	8	-11	7	4	4	0	-4	-362	1712	7	1	-6	47	16	13	-14	3	-111	19
1	8	-10	-12	-19	4	0	-3	-1218	9630	7	1	-5	-30	18	13	-14	4	-18	9
1	8	-9	-4	-32	4	0	-2	-4389	26802	7	1	-4	-2	36	13	-13	-2	-0	1
1	8	-8	-3	-27	4	0	-1	-5253	34945	7	1	-3	74	32	13	-13	-1	-2	7
1	8	-7	-4	-14	4	0	0	-8001	61789	7	1	-2	4	283	13	-13	0	-17	41
1	8	-6	22	-4	4	0	1	-507	4641	7	1	-1	-197	80	13	-13	1	-1	-377
1	8	-5	26	9	4	0	2	-49	407	7	1	0	-92	196	13	-13	2	-24	113
1	8	-4	1	42	4	0	3	-7	43	7	1	1	-7	17	13	-13	3	-2	-140
1	8	-3	11	1	4	0	4	-3	6	7	1	2	-4	-2	13	-13	4	3	-15
1	8	-2	2	11	4	1	-9	-2	-1	7	1	3	0	-1	13	-12	-3	-2	-0
1	8	-1	0	1	4	1	-8	-28	-6	7	2	-9	1	-1	13	-12	-2	-9	-1
1	8	0	-0	2	4	1	-7	8	22	7	2	-8	1	-6	13	-12	-1	-86	-31
1	9	-12	6	3	4	1	-6	16	-20	7	2	-7	10	-7	13	-12	0	-861	-637
1	9	-11	10	3	4	1	-5	82	227	7	2	-6	50	-28	13	-12	1	737	340
1	9	-10	12	1	4	1	-4	64	775	7	2	-5	12	18	13	-12	2	-1024	-720
1	9	-9	6	12	4	1	-3	-1765	2308	7	2	-4	27	-20	13	-12	3	164	14
1	9	-8	-5	-29	4	1	-2	462	9692	7	2	-3	24	29	13	-12	4	24	6
1	9	-7	-0	3	4	1	-1	-6597	5633	7	2	-2	-31	31	13	-12	5	2	0
1	9	-6	-15	6	4	1	0	-4946	9947	7	2	-1	-24	-5	13	-11	-2	12	-3
1	9	-5	-2	-4	4	1	1	-381	781	7	2	0	-22	29	13	-11	-1	116	-36
1	10	-12	3	-1	4	1	2	0	41	7	2	1	2	2	13	-11	0	719	-497
1	10	-11	5	3	4	1	3	-14	7	7	2	2	1	0	13	-11	1	315	-255
1	10	-10	4	2	4	1	4	8	-6	7	3	-8	-5	6	13	-11	2	646	-426
1	10	-9	3	6	4	1	5	3	-2	7	3	-7	1	-19	13	-11	3	122	-130
1	10	-8	0	3	4	1	6	3	1	7	3	-6	13	6	13	-11	4	14	-16
1	10	-7	-2	3	4	2	-10	-0	2	7	3	-5	-2	-7	13	-10	-2	-1	2
1	10	-6	-1	0	4	2	-9	13	-0	7	3	-4	21	-10	13	-10	-1	-9	26
2	-15	8	1	-1	4	2	-8	12	14	7	3	-3	5	10	13	-10	0	27	92
2	-15	9	3	0	4	2	-7	85	42	7	3	-2	-6	22	13	-10	1	18	81
2	-15	10	1	1	4	2	-6	45	36	7	3	-1	-4	-6	13	-10	2	15	71
2	-15	11	-0	2	4	2	-5	150	50	7	3	0	-7	18	13	-10	3	15	22
2	-15	12	0	2	4	2	-4	31	277	7	3	1	-0	2	13	-10	4	3	3
2	-15	13	-4	1	4	2	-3	805	486	7	4	-8	-3	5	13	-9	-1	-10	-6
2	-14	5	-3	-1	4	2	-2	-755	2083	7	4	-7	-3	-4	13	-9	0	-24	1
2	-14	7	3	-0	4	2	-1	-1466	-181	7	4	-6	-11	-10	13	-9	1	-22	-1
2	-14	8	-1	1	4	2	0	-1099	1114	7	4	-5	2	-7	13	-9	2	-17	0
2	-14	9	7	6	4	2	1	-93	105	7	4	-4	-9	-6	13	-9	3	-5	2
2	-14	10	2	5	4	2	2	-35	28	7	4	-3	1	-1	13	-8	-1	6	-4
2	-14	11	-0	8	4	2	3	-4	9	7	4	-2	-1	1	13	-8	0	2	15
2	-14	12	-7	9	4	2	4	-5	6	7	4	0	-1	1	13	-8	1	7	19
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2	-13	5	-6	8	4	3	-10	2	-0	7	5	-6	4	3	13	-7	-1	2	6
2	-13	6	-7	-9	4	3	-9	6	3	7	5	-5	-2	-0	13	-7	0	-1	-5
2	-13	7	-7	18	4	3	-8	37	13	7	5	-4	-0	-2	13	-7	1	2	6
2	-13	8	-33	-20	4	3	-7	1	26	8	-16	0	1	1	13	-7	2	-1	-5
2	-13	9	20	-10	4	3	-6	34	0	8	-16	1	8	15	13	-6	-2	2	0
2	-13	10	26	-27	4	3	-5	62	30	8	-16	3	8	15	13	-6	-1	24	5
2	-13	11	-8	-25	4	3	-4	345	-59	8	-16	4	1	1	13	-6	1	24	5
2	-13	12	-2	8	4	3	-3	150	289	8	-15	1	-4	-0	13	-6	2	2	0
2	-13	13	-10	6	4	3	-2	-323	265	8	-15	3	-4	-0	13	-5	-3	-0	1
2	-12	2	2	-3	4	3	-1	-176	-165	8	-14	2	4	2	13	-5	-2	5	-7
2	-12	3	-3	-0	4	3	0	-204	163	8	-14	3	2	5	13	-5	-1	-2	-0
2	-12	4	9	-10	4	3	1	-23	28	8	-14	4	-2	0	13	-5	0	13	-17
2	-12	5	-20	2	4	3	2	-21	-1	8	-14	6	-4	-0	13	-5	1	-3	1
2	-12	6	-3	19	4	3	3	0	1	8	-14	7	-1	-2	13	-5	2	-0	1
2	-12	7	-46	13	4	3	4	-4	-1	8	-13	0	-6	-6	13	-4	-5	1	-1
2	-12	8	-26	-24	4	3	5	-2	0	8	-13	1	7	8	13	-4	-4	23	-13
2	-12	9	-21	-30	4	4	-9	-5	2	8	-13	2	-12	-24	13	-4	-3	9	88
2	-12	10	-32	-19	4	4	-8	55	-40	8	-13	3	-24	20	13	-4	-2	56	116
2	-12	11	15	-42	4	4	-7	26	29	8	-13	4	4	-7	13	-4	-1	2	213
2	-12	12	3	-9	4	4	-6	20	-10	8	-13	5	-1	3	13	-4	0	41	434

Table 2 (Cont.)

6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin
2	-12	13	-2	2	4	4	-5	46	-48	8	-13	6	-2	-5	13	-4	1	5	36
2	-11	2	-2	1	4	4	-4	60	33	8	-13	7	7	-1	13	-4	2	-2	-0
2	-11	3	9	-2	4	4	-3	-13	51	8	-12	0	8	-0	13	-4	3	2	-3
2	-11	4	12	12	4	4	-2	-100	58	8	-12	1	34	130	13	-3	-4	-1	-0
2	-11	5	44	20	4	4	-1	16	-41	8	-12	2	79	-132	13	-3	-3	1	-0
2	-11	6	-14	71	4	4	0	-67	23	8	-12	3	61	63	13	-3	-2	-1	-0
2	-11	7	-51	11	4	4	1	-1	4	8	-12	4	8	-23	13	-3	-1	-1	-4
2	-11	8	-17	-46	4	4	2	-0	-5	8	-12	5	35	-9	13	-2	-9	1	3
2	-11	9	-11	-15	4	5	-11	-0	-1	8	-12	6	-7	9	13	-2	-7	7	34
2	-11	10	-35	-29	4	5	-9	-7	-8	8	-12	7	2	-4	13	-2	-6	-3	-21
2	-11	11	-14	-83	4	5	-8	14	-17	8	-11	-2	1	-4	13	-2	-5	29	16
2	-11	12	-0	5	4	5	-7	16	-21	8	-11	-1	8	-24	13	-2	-4	-39	36
2	-11	13	-1	-5	4	5	-6	18	-7	8	-11	0	85	-164	13	-2	-3	39	-30
2	-10	1	1	-2	4	5	-5	32	-9	8	-11	1	98	1370	13	-2	-2	-17	27
2	-10	2	-9	-10	4	5	-4	-4	35	8	-11	2	369	-546	13	-2	-1	-13	-25
2	-10	3	12	-29	4	5	-3	-5	15	8	-11	3	16	611	13	-2	0	-14	-9
2	-10	4	84	8	4	5	-2	-28	26	8	-11	4	87	-16	13	-2	2	1	3
2	-10	5	2	169	4	5	-1	-7	5	8	-11	5	2	55	13	0	-2	-1	-0
2	-10	6	-233	87	4	5	0	-18	21	8	-11	6	-15	-0	13	0	0	-1	-0
2	-10	7	-117	-104	4	5	1	-3	3	8	-11	7	-6	5	13	19	-5	-4	-1
2	-10	8	-33	-6	4	6	-10	5	5	8	-11	8	-4	2	13	19	-3	-1	-1
2	-10	9	-33	-10	4	6	-9	-12	-13	8	-10	-4	1	-1	13	19	-1	3	-0
2	-10	10	-53	-60	4	6	-8	29	-29	8	-10	-3	5	-11	13	20	-10	-4	4
2	-10	11	-42	-48	4	6	-7	-11	20	8	-10	-2	49	-101	13	20	-9	-32	34
2	-10	12	-8	-10	4	6	-6	8	-14	8	-10	-1	456	-937	13	20	-8	-281	300
2	-10	13	-3	-3	4	6	-5	21	7	8	-10	0	4530	-9478	13	20	-7	-2541	2717
2	-9	-2	3	-1	4	6	-4	6	-0	8	-10	1	-3280	14432	13	20	-6	-24272	25954
2	-9	-1	2	-2	4	6	-3	4	7	8	-10	2	5494	-11364	13	20	-5	-260691	278861
2	-9	0	34	-17	4	6	-2	7	1	8	-10	3	-740	4022	13	20	-4	1235	-1214
2	-9	1	60	-33	4	6	-1	3	-1	8	-10	4	-58	657	13	20	-3	-260350	278483
2	-9	2	-11	-139	4	6	0	4	2	8	-10	5	-16	64	13	20	-2	-23825	25530
2	-9	3	282	-124	4	7	-11	2	0	8	-10	6	10	-4	13	20	-1	-2481	2660
2	-9	4	372	450	4	7	-10	2	3	8	-10	7	-1	-5	13	20	0	-273	293
2	-9	5	-478	723	4	7	-9	-3	0	8	-10	8	-1	0	13	20	1	-32	34
2	-9	6	-589	-83	4	7	-8	-10	-2	8	-9	-4	4	2	13	20	2	-4	4
2	-9	7	-132	-11	4	7	-7	-4	-8	8	-9	-3	27	16	13	21	-6	-1	8
2	-9	8	-29	0	4	7	-6	1	-8	8	-9	-2	248	151	13	21	-5	-13	81
2	-9	9	-27	-23	4	7	-5	-3	-4	8	-9	-1	2421	1489	13	21	-3	-10	63
2	-9	10	-9	2	4	7	-4	3	-2	8	-9	0	28776	17266	13	21	-2	-1	8
2	-9	11	-11	-3	4	8	-11	2	-1	8	-9	1	19278	6652	13	22	-5	-2	3
2	-9	12	-4	-0	4	8	-10	2	2	8	-9	2	24026	15061	13	22	-3	-2	3
2	-8	-3	-1	1	4	8	-8	1	1	8	-9	3	8436	3480	14	-20	1	-5	-4
2	-8	-2	16	-9	4	8	-7	-2	2	8	-9	4	1080	450	14	-20	2	1	-3
2	-8	-1	103	-53	4	8	-6	-1	-1	8	-9	5	118	22	14	-20	3	-7	-6
2	-8	0	1187	-593	4	11	-3	0	1	8	-9	6	11	-22	14	-20	4	0	-1
2	-8	1	1522	534	4	11	-1	0	1	8	-9	7	1	5	14	-19	-1	-0	-3
2	-8	2	1787	-1862	5	-16	9	-4	-1	8	-8	-3	-13	0	14	-19	0	-2	-24
2	-8	3	2802	671	5	-16	10	1	-3	8	-8	-2	-96	24	14	-19	1	-25	-237
2	-8	4	348	3134	5	-16	11	-0	2	8	-8	-1	-815	301	14	-19	2	41	28
2	-8	5	-2040	1159	5	-16	12	0	1	8	-8	0	-6257	5215	14	-19	3	-33	-284
2	-8	6	-428	369	5	-16	13	3	3	8	-8	1	-4402	5264	14	-19	4	10	-15
2	-8	7	-143	95	5	-16	14	-1	4	8	-8	2	-4569	3283	14	-19	5	-0	-3
2	-8	8	-38	51	5	-15	-12	-16	1	8	-8	3	-1545	1797	14	-18	-2	5	-0
2	-8	9	-11	14	5	-15	-11	4	-18	8	-8	4	-256	296	14	-18	-1	46	-1
2	-8	10	-70	35	5	-15	-10	41	-3	8	-8	5	-92	-39	14	-18	0	446	-14
2	-8	11	-2	2	5	-15	-9	-1	26	8	-8	6	-23	-5	14	-18	1	4874	-150
2	-8	12	-2	1	5	-15	-8	-27	3	8	-8	7	-5	-4	14	-18	2	-9	-42
2	-7	-6	2	-1	5	-15	-7	-4	-2	8	-7	-4	1	-1	14	-18	3	4628	-140
2	-7	-5	15	-7	5	-15	7	-0	2	8	-7	-3	2	-9	14	-18	4	435	-27
2	-7	-4	130	-65	5	-15	8	-13	-3	8	-7	-2	20	-101	14	-18	5	46	-1
2	-7	-3	1147	-569	5	-15	9	-2	-16	8	-7	-1	58	-839	14	-18	6	5	-0
2	-7	-2	10414	-5170	5	-15	10	-26	-11	8	-7	0	-2693	-3404	14	-17	0	5	2
2	-7	-1	99775	-49579	5	-15	11	4	-62	8	-7	1	-2294	-2595	14	-17	1	62	31

Table 2 (Cont.)

6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin
2	-7	0	1082213	-539138	5	-15	12	5	-3	8	-7	2	-1936	-2211	14	-17	3	49	24
2	-7	1	-61962	-127977	5	-15	13	13	7	8	-7	3	-858	-631	14	-17	4	5	2
2	-7	2	1070117	-521200	5	-15	14	-3	7	8	-7	4	-200	-125	14	-16	0	3	2
2	-7	3	88018	-80410	5	-14	0	-1	-3	8	-7	5	-57	-22	14	-16	1	51	22
2	-7	4	4051	-2418	5	-14	4	1	4	8	-7	6	-6	-3	14	-16	3	35	14
2	-7	5	796	814	5	-14	5	13	-7	8	-6	-3	15	-3	14	-16	4	3	2
2	-7	6	-68	630	5	-14	6	4	31	8	-6	-2	70	129	14	-15	0	-1	7
2	-7	7	-46	213	5	-14	7	36	-16	8	-6	-1	511	636	14	-15	1	-9	131
2	-7	8	-41	51	5	-14	8	28	55	8	-6	0	-1914	1943	14	-15	2	-2	-11
2	-7	9	-2	26	5	-14	9	-52	44	8	-6	1	-2458	2635	14	-15	3	-5	68
2	-7	10	-3	8	5	-14	10	-62	-24	8	-6	2	-779	844	14	-15	4	-4	4
2	-7	11	-1	3	5	-14	11	22	-35	8	-6	3	-813	491	14	-14	-1	1	1
2	-6	-5	4	-3	5	-14	12	5	11	8	-6	4	-177	88	14	-14	0	-0	2
2	-6	-4	17	-7	5	-14	13	4	-1	8	-6	5	-23	14	14	-14	1	-167	-29
2	-6	-3	155	-67	5	-14	14	-1	8	8	-6	6	-3	1	14	-14	2	26	10
2	-6	-2	1452	-539	5	-13	2	1	1	8	-5	-4	5	-4	14	-14	3	-70	-11
2	-6	-1	14454	-5188	5	-13	3	7	-0	8	-5	-3	-10	3	14	-14	4	-8	-3
2	-6	0	171064	-61406	5	-13	4	10	-10	8	-5	-2	-208	61	14	-13	-1	-10	6
2	-6	1	44818	-138510	5	-13	5	-1	-8	8	-5	-1	-723	632	14	-13	0	-57	49
2	-6	2	196016	-28864	5	-13	6	9	-11	8	-5	0	453	-2632	14	-13	1	72	-190
2	-6	3	32495	3272	5	-13	7	38	-22	8	-5	1	-1177	768	14	-13	2	-85	83
2	-6	4	11766	896	5	-13	8	7	40	8	-5	2	360	-1054	14	-13	3	21	-63
2	-6	5	2610	3593	5	-13	9	7	3	8	-5	3	10	-266	14	-13	4	4	-10
2	-6	6	422	1076	5	-13	10	33	24	8	-5	4	9	-31	14	-12	-4	-2	-4
2	-6	7	35	261	5	-13	11	-18	18	8	-5	5	-7	-5	14	-12	-3	-17	-34
2	-6	8	2	37	5	-13	12	-28	-36	8	-4	-5	-2	-0	14	-12	-2	-150	-309
2	-6	9	10	66	5	-13	13	-2	-18	8	-4	-4	13	4	14	-12	-1	-1402	-2994
2	-6	10	1	3	5	-13	14	-1	-1	8	-4	-3	14	24	14	-12	0	-14298	-33490
2	-6	11	0	2	5	-12	2	3	2	8	-4	-2	172	255	14	-12	1	1214	1930
2	-5	-5	5	1	5	-12	3	-3	3	8	-4	-1	869	4159	14	-12	2	-14594	-33977
2	-5	-4	55	-1	5	-12	4	-12	-0	8	-4	0	-1290	-590	14	-12	3	-882	-2649
2	-5	-3	509	-44	5	-12	5	-15	-30	8	-4	1	784	4584	14	-12	4	-77	-260
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2	-5	-1	49164	-5079	5	-12	7	35	50	8	-4	3	-99	33	14	-12	6	-2	-4
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2	-5	3	193319	-71175	5	-12	11	0	27	8	-3	-4	23	14	14	-11	1	77	-11
2	-5	4	50131	9954	5	-12	12	-47	-10	8	-3	-3	154	69	14	-11	2	96	-4
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2	-5	6	1311	774	5	-12	14	-8	-3	8	-3	-1	-593	-539	14	-11	4	2	-1
2	-5	7	176	128	5	-12	15	-2	-1	8	-3	0	2729	2006	14	-10	-1	-4	4
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2	-5	10	2	3	5	-11	2	3	25	8	-3	3	8	-17	14	-10	2	-6	11
2	-5	11	1	1	5	-11	3	-37	26	8	-3	4	3	2	14	-9	-1	0	-2
2	-4	-8	1	2	5	-11	4	-89	-35	8	-3	5	3	-1	14	-9	1	0	-2
2	-4	-7	-3	-8	5	-11	5	51	-174	8	-2	-9	3	0	14	-8	-1	2	0
2	-4	-6	1	-12	5	-11	6	253	26	8	-2	-7	20	6	14	-8	1	2	0
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2	-4	-2	15716	3252	5	-11	10	-5	8	8	-2	-3	-36446	14654	14	-6	-1	-2	-1
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2	-4	4	114976	18871	5	-10	0	-50	29	8	-2	3	-181	107	14	-4	-4	11	-6
2	-4	5	15857	2734	5	-10	1	-112	-71	8	-2	4	-21	19	14	-4	-3	3	23
2	-4	6	2062	380	5	-10	2	-126	250	8	-2	5	-2	2	14	-4	-2	14	6
2	-4	7	270	52	5	-10	3	-401	1	8	-1	-8	1	-3	14	-4	-1	5	52
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Table 2 (Cont.)

6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin
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2	-3	-8	2	-8	5	-10	7	-282	276	8	-1	-4	-35	28	14	-2	-8	-9	6
2	-3	-7	0	-2	5	-10	8	-30	75	8	-1	-3	70	50	14	-2	-7	6	5
2	-3	-6	-0	7	5	-10	9	13	38	8	-1	-2	-45	232	14	-2	-6	-17	1
2	-3	-5	9	16	5	-10	10	-27	25	8	-1	-1	11	282	14	-2	-5	-4	20
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2	-3	-2	-5623	-6746	5	-10	13	-2	3	8	-1	3	1	-7	14	-2	-2	3	-8
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2	-3	8	13	1	5	-9	5	3168	448	8	0	2	-3	-4	14	20	-5	-284	82
2	-3	9	4	-1	5	-9	6	-325	1401	8	0	3	0	-1	14	20	-4	27	-7
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2	-1	-11	-0	-5	5	-8	13	1	1	8	3	1	-5	1	15	-19	1	1580	-3399
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2	-1	-9	-0	-25	5	-7	-4	-14	5	8	4	-6	-1	-1	15	-19	3	1696	-3675
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2	-1	-6	53	230	5	-7	-1	-12022	3464	8	22	-8	3	-0	15	-19	6	2	-4
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2	-1	-2	301853	830576	5	-7	3	-18051	-13654	8	22	-3	2876	-339	15	-18	3	808	-58
2	-1	-1	302608	-1248850	5	-7	4	10923	17011	8	22	-2	268	-32	15	-18	4	78	-6
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2	-1	3	1911	-16550	5	-7	8	79	47	9	-17	3	1	-1	15	-17	3	27	-19
2	-1	4	206	-1934	5	-7	9	21	3	9	-16	0	0	2	15	-17	4	3	-2
2	-1	5	-18	-245	5	-7	10	36	6	9	-16	1	2	28	15	-16	0	3	2
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Table 2 (Cont.)

6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin
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2	-1	8	-0	1	5	-6	-5	-6	-0	9	-15	1	-2	-0	15	-16	4	3	2
2	-1	9	-5	-5	5	-6	-4	-38	-4	9	-15	2	0	-1	15	-15	0	1	3
2	-1	10	-3	-4	5	-6	-3	-362	-58	9	-15	3	-2	-0	15	-15	1	-32	83
2	0	-9	6	3	5	-6	-2	-3351	-535	9	-15	4	0	-1	15	-15	2	7	-6
2	0	-8	-4	1	5	-6	-1	-34881	-5753	9	-14	1	8	-3	15	-15	3	-15	39
2	0	-7	15	3	5	-6	0	-451838	-77986	9	-14	2	5	-2	15	-15	4	-1	4
2	0	-6	-103	-78	5	-6	1	-483264	200848	9	-14	3	5	3	15	-14	-1	1	2
2	0	-5	-479	-294	5	-6	2	-382216	-301936	9	-14	4	-2	2	15	-14	0	5	9
2	0	-4	-3271	-2511	5	-6	3	-27216	36318	9	-14	6	-3	3	15	-14	1	-72	-49
2	0	-3	-19862	-15006	5	-6	4	-30908	-23897	9	-14	7	-0	-2	15	-14	2	15	21
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2	0	-1	-58551	-61071	5	-6	6	1462	-977	9	-13	0	-2	-7	15	-14	4	-3	-2
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2	0	4	17	-3	5	-6	11	1	-1	9	-13	5	-4	-7	15	-13	2	-132	31
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2	1	-10	-11	1	5	-5	-3	-1175	-707	9	-12	0	-0	-14	15	-12	-1	20	-42
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2	2	6	5	-6	5	-3	1	-462079	1871370	9	-9	5	46	14	15	-5	0	-2	-0
2	2	7	23	-29	5	-3	2	574337	1426022	9	-9	6	-1	12	15	-5	1	-3	2
2	2	9	-2	2	5	-3	3	76439	189941	9	-8	-3	-4	-3	15	-4	-5	2	3
2	3	-12	2	-1	5	-3	4	9252	23169	9	-8	-2	-44	-16	15	-4	-4	-6	1

Table 2 (Cont.)

6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin
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2	3	-10	-12	-10	5	-3	6	141	322	9	-8	0	-2570	246	15	-4	-2	-5	-1
2	3	-9	28	-2	5	-3	7	31	33	9	-8	1	-2257	371	15	-4	-1	25	-16
2	3	-8	3	-8	5	-3	8	1	5	9	-8	2	-1643	-47	15	-4	0	8	2
2	3	-7	-31	59	5	-3	9	3	0	9	-8	3	-677	221	15	-4	2	1	3
2	3	-6	-153	187	5	-2	-9	2	3	9	-8	4	-85	-41	15	-2	-8	-3	3
2	3	-5	-813	719	5	-2	-8	17	26	9	-8	5	-13	-14	15	-2	-7	1	-4
2	3	-4	-2087	911	5	-2	-7	139	211	9	-8	6	-0	-7	15	-2	-6	-1	5
2	3	-3	-7468	6708	5	-2	-6	1127	1772	9	-7	-4	-1	-2	15	-2	-5	-1	-4
2	3	-2	-23114	-7888	5	-2	-5	9505	14599	9	-7	-3	-4	-11	15	-2	-4	2	3
2	3	-1	-697	-14478	5	-2	-4	77904	119945	9	-7	-2	41	-42	15	-2	-3	-2	-0
2	3	0	-14117	-10246	5	-2	-3	619095	958690	9	-7	-1	236	-359	15	-2	-2	1	3
2	3	1	-1064	-837	5	-2	-2	4249517	6707016	9	-7	0	-67	-1874	15	-2	2	-1	-3
2	3	2	-76	-111	5	-2	-1	-8145351	-7137647	9	-7	1	-59	-1748	15	18	-5	-2	0
2	3	3	21	-32	5	-2	0	14023786	21624974	9	-7	2	-91	-1087	15	18	-4	1	0
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2	3	5	4	-6	5	-2	2	-981995	-676782	9	-7	4	-59	-117	15	18	-2	1	0
2	3	6	1	-1	5	-2	3	-114814	-77107	9	-7	5	-1	-9	15	19	-7	-3	2
2	3	7	-4	4	5	-2	4	-13313	-8935	9	-6	-4	4	1	15	19	-6	-33	15
2	4	-11	2	2	5	-2	5	-1572	-1035	9	-6	-3	12	3	15	19	-5	-348	165
2	4	-10	1	2	5	-2	6	-190	-121	9	-6	-2	3	80	15	19	-3	-366	169
2	4	-9	3	29	5	-2	7	-24	-17	9	-6	-1	150	388	15	19	-2	-33	15
2	4	-8	19	-5	5	-2	8	-3	-2	9	-6	0	-19	579	15	19	-1	6	5
2	4	-7	-25	59	5	-1	-10	1	-3	9	-6	1	-377	556	15	20	-6	-8	6
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2	4	-5	-93	636	5	-1	-8	16	-6	9	-6	3	-94	40	15	20	-4	-9	2
2	4	-4	15	2813	5	-1	-7	22	-11	9	-6	4	-29	2	15	20	-3	-73	53
2	4	-3	-2794	1036	5	-1	-6	409	-126	9	-6	5	-5	-0	15	20	-2	-3	5
2	4	-2	-3226	-3021	5	-1	-5	3302	-843	9	-5	-3	-4	5	15	21	-6	-4	4
2	4	-1	1489	-1782	5	-1	-4	26637	-6856	9	-5	-2	-154	-8	15	21	-5	-39	47
2	4	0	-2263	-2149	5	-1	-3	209613	-58219	9	-5	-1	-749	119	15	21	-3	-24	29
2	4	1	-169	-181	5	-1	-2	1435123	-422738	9	-5	0	24	-340	15	21	-2	-4	4
2	4	2	-64	-11	5	-1	-1	-28676	-355199	9	-5	1	-997	116	15	22	-6	-0	4
2	4	3	-5	-0	5	-1	0	3662764	-1021973	9	-5	2	16	-71	15	22	-5	-8	3
2	4	4	-4	2	5	-1	1	160304	-363919	9	-5	3	12	-13	15	22	-4	-1	9
2	4	5	1	0	5	-1	2	5945	-38921	9	-5	4	2	-0	15	22	-3	-4	1
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2	5	-9	8	25	5	-1	5	0	-55	9	-4	-3	19	-26	15	24	-6	-3	-0
2	5	-8	9	32	5	-1	6	-1	-7	9	-4	-2	197	-334	15	24	-4	-3	-0
2	5	-7	24	24	5	-1	8	-1	3	9	-4	-1	256	-1216	15	25	-6	-2	-0
2	5	-6	127	119	5	0	-9	-6	2	9	-4	0	575	-1450	15	25	-4	-2	-0
2	5	-5	489	590	5	0	-8	-10	37	9	-4	1	301	-1296	16	-21	1	-3	-1
2	5	-4	-342	836	5	0	-7	-200	311	9	-4	2	-12	-343	16	-21	2	0	-3
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2	5	-2	-1192	-1363	5	0	-5	-13792	20455	9	-4	4	0	-7	16	-21	4	0	-1
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2	5	0	-1285	-1234	5	0	-3	-661353	989271	9	-3	-5	-1	3	16	-20	1	-61	-81
2	5	1	-103	-112	5	0	-2	-1286894	2200676	9	-3	-4	-10	14	16	-20	2	59	-103
2	5	2	-17	-15	5	0	-1	-2572670	3656119	9	-3	-3	-72	96	16	-20	3	-83	-93
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2	6	-9	4	-2	5	0	3	-2136	3387	9	-3	1	3	156	16	-19	-3	-3	-27
2	6	-8	29	4	5	0	4	-234	369	9	-3	2	-2	17	16	-19	-2	-30	-238
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2	6	-3	-17	-77	5	1	-9	-4	15	9	-2	-8	6	-17	16	-19	3	-27258	-221106
2	6	-2	-80	-97	5	1	-8	12	86	9	-2	-7	-20	12	16	-19	4	-2620	-20588
2	6	-1	-32	-36	5	1	-7	-5	304	9	-2	-6	9	-34	16	-19	5	-277	-2156
2	6	0	-92	-76	5	1	-6	-587	2593	9	-2	-5	10	-8	16	-19	6	-30	-238

Table 2 (Cont.)

6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin
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2	6	3	-2	-0	5	1	-4	-40035	86625	9	-2	-3	-8270	-1817	16	-19	8	-0	-3
2	7	-12	3	3	5	1	-3	-287502	120382	9	-2	-2	-10369	15459	16	-18	0	9	-5
2	7	-10	103	-27	5	1	-2	-427499	1035570	9	-2	-1	-33122	2892	16	-18	1	97	-87
2	7	-9	66	-8	5	1	-1	-1067269	323002	9	-2	0	-49220	14291	16	-18	2	2	2
2	7	-8	36	-1	5	1	0	-957723	794237	9	-2	1	-3732	1223	16	-18	3	80	-71
2	7	-7	50	-5	5	1	1	-71874	59516	9	-2	2	-329	117	16	-18	4	7	-7
2	7	-6	35	66	5	1	2	-6739	5562	9	-2	3	-39	15	16	-17	-1	2	1
2	7	-5	-20	58	5	1	3	-716	559	9	-2	4	-3	2	16	-17	0	2	-3
2	7	-4	-30	5	5	1	4	-97	46	9	-1	-7	2	-8	16	-17	1	37	-39
2	7	-3	-7	-4	5	1	5	-11	5	9	-1	-6	-0	-19	16	-17	3	24	-28
2	7	-2	6	-6	5	1	6	-3	-3	9	-1	-5	-11	21	16	-17	4	2	-3
2	7	0	4	-5	5	2	-12	1	1	9	-1	-4	7	-24	16	-16	0	2	1
2	8	-12	-3	9	5	2	-11	4	0	9	-1	-3	24	14	16	-16	1	31	19
2	8	-11	4	-8	5	2	-10	10	13	9	-1	-2	29	9	16	-16	3	19	12
2	8	-10	45	-40	5	2	-9	16	-18	9	-1	-1	62	24	16	-16	4	2	1
2	8	-9	37	-42	5	2	-8	64	51	9	-1	0	43	52	16	-15	0	3	-0
2	8	-8	23	-13	5	2	-7	204	337	9	-1	1	5	0	16	-15	1	-16	16
2	8	-7	7	-3	5	2	-6	1077	2159	9	-1	2	-7	9	16	-15	2	6	-0
2	8	-6	-11	30	5	2	-5	3068	9923	9	-1	3	-1	1	16	-15	3	-9	8
2	8	-5	-3	9	5	2	-4	-15633	17839	9	0	-6	-3	2	16	-14	-1	-0	2
2	8	-4	-9	7	5	2	-3	29284	79813	9	0	-5	7	-9	16	-14	0	1	14
2	8	-3	9	-14	5	2	-2	-194834	193400	9	0	-4	2	2	16	-14	1	-4	-8
2	8	-2	3	3	5	2	-1	-174279	-79725	9	0	-3	-4	-9	16	-14	2	1	20
2	8	-1	1	-3	5	2	0	-185752	83506	9	0	-2	9	-9	16	-14	3	-1	-0
2	9	-13	0	1	5	2	1	-14511	6598	9	0	-1	-28	-10	16	-13	-2	-1	-1
2	9	-12	1	14	5	2	2	-1408	645	9	0	0	2	7	16	-13	-1	-21	-0
2	9	-11	-7	-8	5	2	3	-148	69	9	0	1	-4	-2	16	-13	0	-309	-93
2	9	-10	14	-5	5	2	4	-20	10	9	1	-7	-0	2	16	-13	1	92	12
2	9	-9	-3	-4	5	2	5	-0	-2	9	1	-6	-3	-4	16	-13	2	-331	-96
2	9	-8	0	-12	5	3	-11	1	-4	9	1	-5	-5	3	16	-13	3	-8	-13
2	9	-7	15	10	5	3	-10	11	17	9	1	-4	-4	-4	16	-13	4	-1	-1
2	9	-6	-10	22	5	3	-9	6	-46	9	1	-3	2	1	16	-12	-1	1	-2
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2	9	-3	-0	1	5	3	-6	1535	969	9	1	0	0	1	16	-12	3	1	-2
2	10	-12	2	16	5	3	-5	1647	3444	9	1	1	-2	-1	16	6	-3	-0	1
2	10	-11	-5	5	5	3	-4	24411	5841	9	2	-6	-1	2	16	6	-1	-0	1
2	10	-10	-3	0	5	3	-3	-1628	28855	9	2	-5	1	1	16	18	-5	-2	4
2	10	-9	-2	-2	5	3	-2	-53729	18417	9	2	-4	-1	2	16	18	-3	-2	4
2	10	-8	-12	0	5	3	-1	-12501	-30964	9	2	-3	-3	-3	16	19	-7	1	4
2	10	-7	0	-17	5	3	0	-40503	10403	10	-23	2	0	1	16	19	-6	9	37
2	10	-6	6	-2	5	3	1	-3389	868	10	-23	4	0	1	16	19	-5	98	402
2	11	-12	1	4	5	3	2	-342	89	10	-18	1	-0	-4	16	19	-3	94	383
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2	11	-8	-1	-1	5	4	-11	16	-6	10	-17	3	16	1	16	20	-5	15	34
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3	-14	11	1	-2	5	4	-5	6123	-2563	10	-15	3	-1	-6	16	21	-2	-0	1
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3	-13	8	-12	-21	5	4	3	-51	10	10	-14	6	-3	2	17	-13	0	10	32
3	-13	9	-8	16	5	4	4	-6	1	10	-13	-1	2	-2	17	-13	2	10	32

Table 2 (Cont.)

6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin
3	-13	10	8	-13	5	5	-13	1	-2	10	-13	0	2	-10	17	-13	3	1	3
3	-13	11	11	-4	5	5	-12	2	-3	10	-13	1	151	-263	17	12	-4	3	0
3	-13	12	10	-1	5	5	-11	40	-40	10	-13	2	-107	29	17	12	-2	3	0
3	-13	13	2	0	5	5	-10	-14	-14	10	-13	3	71	-131	18	11	-4	2	1
3	-12	3	7	-3	5	5	-9	19	-29	10	-13	4	-22	-17	18	11	-2	2	1
3	-12	4	14	-3	5	5	-8	48	-44	10	-13	5	-3	-8	18	12	-4	0	-2
3	-12	5	32	-5	5	5	-7	247	-182	10	-13	6	-1	-8	18	12	-2	0	-2
3	-12	6	24	-18	5	5	-6	932	-1473	10	-12	-2	-2	1	18	13	-4	-1	-2
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3	-11	4	4	-6	5	6	-13	1	-3	10	-12	7	3	4	19	11	-4	-99	-76
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3	-11	6	25	16	5	6	-11	6	-8	10	-12	9	-1	-2	19	11	-1	-10	-7
3	-11	7	-9	17	5	6	-10	-47	-24	10	-11	-3	-2	-3	19	12	-5	3	-2
3	-11	8	8	30	5	6	-9	-12	-67	10	-11	-2	-13	-20	19	12	-4	35	-21
3	-11	9	-15	57	5	6	-8	28	-90	10	-11	-1	-157	-227	19	12	-2	30	-18
3	-11	10	-30	64	5	6	-7	-22	-469	10	-11	0	-1417	-2087	19	12	-1	3	-2
3	-11	11	-8	21	5	6	-6	694	-373	10	-11	1	3288	3169	19	13	-4	3	12
3	-11	12	-1	6	5	6	-5	421	369	10	-11	2	-1856	-2731	19	13	-2	2	8
3	-11	13	-0	1	5	6	-4	-110	227	10	-11	3	990	919	19	14	-4	-6	0
3	-10	0	-0	-1	5	6	-3	-85	-28	10	-11	4	176	140	19	14	-2	-3	0
3	-10	1	-1	-2	5	6	-2	2	-32	10	-11	5	5	21	20	10	-4	9	-0
3	-10	2	-13	-1	5	6	-1	-15	-10	10	-11	6	-14	-7	20	10	-2	9	-0
3	-10	3	-12	-23	5	6	0	-6	2	10	-11	7	-12	-2	20	11	-6	-2	9
3	-10	4	29	-41	5	7	-14	-1	-2	10	-11	8	-9	-4	20	11	-5	-23	84
3	-10	5	61	-3	5	7	-13	-1	-2	10	-10	-4	2	-0	20	11	-4	-246	915
3	-10	6	41	47	5	7	-12	-23	-47	10	-10	-3	23	-4	20	11	-2	-239	889
3	-10	7	13	77	5	7	-11	4	-10	10	-10	-2	212	-40	20	11	-1	-23	84
3	-10	8	1	30	5	7	-10	-24	-27	10	-10	-1	2055	-449	20	11	0	-2	9
3	-10	9	-1	62	5	7	-9	-34	-8	10	-10	0	21409	-6555	20	12	-5	-2	-1
3	-10	10	20	70	5	7	-8	-82	-101	10	-10	1	7086	-3983	20	12	-4	-25	-15
3	-10	12	3	11	5	7	-7	85	-213	10	-10	2	19481	-5685	20	12	-2	-20	-12
3	-10	13	0	2	5	7	-6	194	11	10	-10	3	3989	-1965	20	12	-1	-2	-1
3	-9	-1	-4	-5	5	7	-5	16	77	10	-10	4	493	-266	20	13	-4	10	-9
3	-9	0	-10	-43	5	7	-4	-19	7	10	-10	5	48	-7	20	13	-2	6	-6
3	-9	1	36	-73	5	7	-3	-0	-6	10	-10	6	-19	-36	20	14	-4	4	6
3	-9	2	-120	-107	5	7	-2	4	-3	10	-10	7	27	-1	20	14	-2	2	3
3	-9	3	40	-214	5	7	0	1	-0	10	-10	8	-3	1	21	10	-5	1	0
3	-9	4	247	-156	5	8	-15	-2	-1	10	-9	-3	-3	5	21	10	-4	13	1
3	-9	5	330	96	5	8	-14	-7	-3	10	-9	-2	-1	33	21	10	-2	13	1
3	-9	6	166	158	5	8	-13	2	-0	10	-9	-1	-144	285	21	10	-1	1	0
3	-9	7	20	-3	5	8	-12	-31	-20	10	-9	0	-33	2206	21	11	-5	-1	2
3	-9	8	22	13	5	8	-11	-20	-18	10	-9	1	286	1635	21	11	-4	-11	25
3	-9	9	15	31	5	8	-10	-5	-4	10	-9	2	-210	1719	21	11	-2	-10	22
3	-9	10	33	26	5	8	-9	-30	-14	10	-9	3	63	495	21	11	-1	-1	2
3	-9	11	4	2	5	8	-8	-9	-56	10	-9	4	55	101	21	12	-4	-5	-4
3	-9	12	2	1	5	8	-7	43	-30	10	-9	5	-17	-16	21	12	-2	-5	-4
3	-8	-3	-3	-6	5	8	-6	23	15	10	-9	6	36	-39	22	10	-6	2	1
3	-8	-2	-22	-55	5	8	-5	-4	7	10	-9	7	6	-7	22	10	-5	18	6
3	-8	-1	-190	-530	5	8	-4	-2	2	10	-8	-3	2	-3	22	10	-4	193	60
3	-8	0	-1909	-5443	5	8	-3	1	-3	10	-8	-2	-11	2	22	10	-2	196	61
3	-8	1	2678	-905	5	9	-14	-2	-1	10	-8	-1	-142	-72	22	10	-1	18	6
3	-8	2	-2786	-6758	5	9	-13	-24	5	10	-8	0	-898	882	22	10	0	2	1
3	-8	3	1399	-1879	5	9	-12	-47	-6	10	-8	1	-296	1009	22	16	-5	-3	6
3	-8	4	1282	-553	5	9	-11	-16	-11	10	-8	2	-1146	624	22	16	-3	-3	6
3	-8	5	937	74	5	9	-10	-12	-35	10	-8	3	-50	253	23	16	-7	-2	2
3	-8	6	153	-35	5	9	-9	-7	-9	10	-8	4	-82	72	23	16	-6	-14	20

Table 2 (Cont.)

6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin
3	-8	7	54	39	5	9	-8	31	-32	10	-8	5	-35	46	23	16	-5	-154	211
3	-8	8	19	21	5	9	-7	8	-0	10	-8	6	-1	-32	23	16	-3	-154	211
3	-8	9	10	5	5	9	-6	9	-1	10	-8	7	1	-2	23	16	-2	-14	20
3	-8	10	9	2	5	9	-5	-1	3	10	-7	-4	-1	-2	23	16	-1	-2	2
3	-8	11	3	-0	5	9	-4	2	-4	10	-7	-3	-4	-8	25	15	-5	2	2
3	-7	-4	-2	-7	5	9	-3	5	-3	10	-7	-2	-2	26	25	15	-3	2	2
3	-7	-3	-23	-69	5	10	-14	5	-7	10	-7	-1	-74	205					

Table 3. Fourier representation of δz_{2mjk} (periodic part). The coefficients are in units of 10^{-13}

6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin
0	0	0	26	93	2	1	-2	-544	5	4	1	1	4	-3	6	-2	-2	-522	-772
0	0	1	52	243	2	1	-1	-13438	-10596	4	2	-5	4	-2	6	-2	-1	-7579	4465
0	0	2	3	12	2	1	0	2881	2044	4	2	-4	-1	-12	6	-2	0	1776	-1815
0	0	3	0	3	2	1	1	198	172	4	2	-3	-30	-40	6	-2	1	-4401	-5596
0	1	-4	0	-4	2	1	2	12	9	4	2	-2	52	-82	6	-2	2	-197	-266
0	1	-3	62	57	2	2	-7	2	-7	4	2	-1	-26	12	6	-2	3	-13	-17
0	1	-2	516	575	2	2	-6	5	-1	4	2	0	6	-1	6	-2	4	-2	-2
0	1	-1	10413	7802	2	2	-5	-4	3	4	3	-4	-17	2	6	-1	-5	-1	1
0	1	0	-1894	-1347	2	2	-4	26	28	4	3	-3	-0	-21	6	-1	-4	-2	2
0	1	1	332	-175	2	2	-3	335	-51	4	3	-2	15	-16	6	-1	-3	-20	-5
0	1	2	17	-13	2	2	-2	3428	-151	4	3	-1	-8	4	6	-1	-2	86	-117
0	1	3	1	-2	2	2	-1	-1342	-1852	4	4	-5	5	-0	6	-1	-1	-129	-311
0	2	-5	1	-7	2	2	0	305	446	4	4	-3	-5	0	6	-1	0	20	73
0	2	-4	27	-2	2	2	1	24	32	5	-11	5	0	-12	6	-1	1	8	12
0	2	-3	-19	146	2	2	2	2	2	5	-11	6	6	2	6	0	-4	7	2
0	2	-2	-621	-201	2	3	-7	-1	1	5	-11	7	0	-12	6	0	-2	-20	-14
0	2	-1	-638	1	2	3	-6	-6	15	5	-11	8	6	-1	6	0	-1	-17	26
0	2	0	219	10	2	3	-5	7	-6	5	-10	2	1	1	6	0	0	2	-12
0	2	1	40	2	2	3	-4	63	-43	5	-10	3	-9	3	6	1	-2	-20	-6
0	2	2	2	0	2	3	-3	441	-237	5	-10	4	8	2	6	1	-1	3	1
0	3	-4	-10	8	2	3	-2	957	488	5	-10	5	-9	26	6	1	0	2	-1
0	3	-3	28	-3	2	3	-1	-131	-224	5	-10	6	-26	-9	6	2	-3	-2	-6
0	3	-2	219	21	2	3	0	21	62	5	-10	7	-4	-12	6	2	-1	-2	-6
0	3	-1	45	-35	2	3	1	0	5	5	-10	8	15	-13	7	-10	0	3	-3
0	3	0	-17	10	2	4	-7	2	1	5	-10	9	-2	1	7	-10	1	-8	-2
0	3	1	-1	1	2	4	-6	7	5	5	-9	0	-2	7	7	-10	2	52	19
0	4	-3	35	-23	2	4	-5	6	-28	5	-9	1	24	-33	7	-10	3	2	1
0	4	-2	-4	75	2	4	-4	45	-92	5	-9	2	-163	231	7	-9	-1	-7	1
0	4	-1	3	-9	2	4	-3	140	-4	5	-9	3	97	14	7	-9	0	-154	31
0	4	0	-4	-4	2	4	-2	117	196	5	-9	4	28	114	7	-9	1	-30	102
1	-8	3	-12	-0	2	4	-1	-14	-29	5	-9	5	-98	35	7	-9	2	371	-716
1	-8	4	2	-5	2	4	0	-0	6	5	-9	6	-18	-37	7	-9	3	18	-28
1	-8	5	-12	-0	2	5	-7	-1	6	5	-9	7	3	-24	7	-9	4	1	-2
1	-8	6	-1	-6	2	5	-6	-8	-11	5	-9	8	-7	7	7	-8	-1	0	-4
1	-7	0	-4	5	2	5	-5	-17	-24	5	-9	9	-3	-5	7	-8	0	-1	-79
1	-7	1	25	1	2	5	-4	25	-24	5	-8	-1	2	-7	7	-8	1	-10	57
1	-7	2	-168	-20	2	5	-3	21	11	5	-8	0	35	-154	7	-8	2	118	128
1	-7	3	11	21	2	5	-2	8	65	5	-8	1	-515	376	7	-8	3	-9	11
1	-7	4	-30	26	2	5	-1	-12	-1	5	-8	2	3664	-2256	7	-7	-1	6	14
1	-7	5	-20	-10	2	5	0	1	2	5	-8	3	573	220	7	-7	0	79	31
1	-7	6	-3	-2	2	6	-6	-5	-2	5	-8	4	-208	372	7	-7	1	-81	-18
1	-7	7	0	4	2	6	-5	1	-6	5	-8	5	-158	-123	7	-7	2	-127	144
1	-6	0	16	-3	2	6	-4	-5	-2	5	-8	6	10	-31	7	-7	3	-9	2
1	-6	1	-75	-48	2	6	-3	1	-6	5	-8	7	-1	-4	7	-7	4	5	-5
1	-6	2	511	375	3	-9	3	0	-6	5	-8	8	-1	8	7	-6	-2	-2	1
1	-6	3	-20	190	3	-9	4	-23	-10	5	-7	-2	1	-1	7	-6	-1	-43	15
1	-6	4	-102	15	3	-9	5	3	-4	5	-7	-1	11	-19	7	-6	0	-35	113
1	-6	5	-11	0	3	-9	6	-11	-6	5	-7	0	209	-326	7	-6	1	33	-350
1	-6	6	8	9	3	-8	0	-10	4	5	-7	1	-1066	601	7	-6	2	47	-34
1	-5	-1	6	3	3	-8	1	24	23	5	-7	2	6323	172	7	-6	3	14	-9
1	-5	0	100	28	3	-8	2	-168	-168	5	-7	3	572	2047	7	-5	-2	0	-4
1	-5	1	-312	-224	3	-8	3	-13	48	5	-7	4	-901	-31	7	-5	-1	8	-82
1	-5	2	714	1741	3	-8	4	-33	31	5	-7	5	-56	-54	7	-5	0	-46	-124
1	-5	3	-379	424	3	-8	5	-27	7	5	-7	6	12	11	7	-5	1	-88	204
1	-5	4	-19	23	3	-8	6	-5	5	5	-7	7	11	17	7	-5	2	13	-46
1	-5	5	13	2	3	-8	7	4	3	5	-7	8	2	0	7	-5	3	1	-9
1	-5	6	11	-2	3	-7	-1	3	2	5	-6	-2	6	-1	7	-4	-2	2	-2
1	-4	-2	1	3	3	-7	0	62	35	5	-6	-1	88	-36	7	-4	-1	315	149
1	-4	-1	31	29	3	-7	1	-144	-231	5	-6	0	1747	-766	7	-4	0	-28	-42
1	-4	0	589	500	3	-7	2	712	1499	5	-6	1	-5735	1646	7	-4	1	86	318
1	-4	1	-1857	-1764	3	-7	3	-23	287	5	-6	2	14163	12284	7	-4	2	-10	-2
1	-4	2	-1034	4750	3	-7	4	-72	106	5	-6	3	-3555	2751	7	-3	-3	-4	-9

Table 3 (Cont.)

6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin
1	-4	3	-52	182	3	-7	5	1	19	5	-6	4	-204	-23	7	-3	-2	-98	-26
1	-4	4	33	6	3	-7	6	15	1	5	-6	5	82	46	7	-3	-1	-2446	-277
1	-4	5	21	-10	3	-6	-1	13	8	5	-6	6	-1	-2	7	-3	0	352	48
1	-3	-2	6	11	3	-6	0	191	177	5	-6	7	9	3	7	-3	1	64	224
1	-3	-1	63	227	3	-6	1	-498	-657	5	-5	-3	3	1	7	-3	2	3	18
1	-3	0	1249	3759	3	-6	2	693	2804	5	-5	-2	28	8	7	-2	-5	-1	10
1	-3	1	-7327	-14209	3	-6	3	26	702	5	-5	-1	530	109	7	-2	-4	-27	15
1	-3	2	-733	-1175	3	-6	4	40	10	5	-5	0	10841	1170	7	-2	-3	-271	146
1	-3	3	94	-263	3	-6	5	17	-8	5	-5	1	-38049	-1021	7	-2	-2	-3077	1368
1	-3	4	7	-16	3	-6	6	8	-10	5	-5	2	-18195	33415	7	-2	-1	-57795	29986
1	-3	5	2	-5	3	-5	-2	2	4	5	-5	3	-1411	798	7	-2	0	10126	-5754
1	-2	-3	-1	-3	3	-5	-1	44	50	5	-5	4	320	-15	7	-2	1	812	-1338
1	-2	-2	-5	-51	3	-5	0	716	981	5	-5	5	44	-3	7	-2	2	53	-59
1	-2	-1	-44	-957	3	-5	1	-2955	-3090	5	-5	6	-3	-1	7	-2	3	3	-4
1	-2	0	-2468	-484	3	-5	2	3132	4049	5	-5	7	2	-2	7	-1	-3	-21	15
1	-2	1	-2174	-4100	3	-5	3	109	-51	5	-4	-3	-5	16	7	-1	-2	28	-46
1	-2	2	-1912	-1161	3	-5	4	25	-74	5	-4	-2	-95	165	7	-1	-1	-56	113
1	-2	3	-1	-198	3	-5	5	13	-12	5	-4	-1	-1389	3134	7	-1	0	10	-14
1	-2	4	2	-29	3	-4	-2	14	-1	5	-4	0	2487	45868	7	-1	1	1	-1
1	-2	5	1	-1	3	-4	-1	195	-66	5	-4	1	-36728	-171387	7	0	-2	-27	-34
1	-2	6	-4	6	3	-4	0	2728	589	5	-4	2	-7233	-11661	7	0	-1	-6	23
1	-1	-4	7	-1	3	-4	1	-14707	-3189	5	-4	3	649	-2025	7	0	0	3	-6
1	-1	-3	87	-17	3	-4	2	-2327	-1563	5	-4	4	56	-155	7	1	-2	-2	-14
1	-1	-2	1220	-168	3	-4	3	-201	-362	5	-4	5	-7	-1	7	3	-2	5	1
1	-1	-1	27481	-3365	3	-4	4	-13	-13	5	-4	6	3	-4	7	3	0	-5	-1
1	-1	0	-6478	-2823	3	-4	5	-2	-5	5	-3	-4	-4	-8	8	-10	0	-1	-18
1	-1	1	16032	16337	3	-3	-3	6	-2	5	-3	-3	-62	-118	8	-10	1	-10	-6
1	-1	2	722	652	3	-3	-2	34	-42	5	-3	-2	-681	-1583	8	-10	2	76	58
1	-1	3	46	39	3	-3	-1	1086	-338	5	-3	-1	-13553	-36220	8	-10	3	4	3
1	-1	4	3	6	3	-3	0	-6003	1411	5	-3	0	-20307	-6908	8	-9	-1	-2	-0
1	0	-4	-5	2	3	-3	1	11858	1319	5	-3	1	40969	-16940	8	-9	0	-51	-10
1	0	-3	9	-31	3	-3	2	-601	-849	5	-3	2	2144	-7241	8	-9	1	-3	14
1	0	-2	207	-493	3	-3	3	27	-11	5	-3	3	160	-364	8	-9	2	72	-88
1	0	-1	-3063	-5533	3	-3	4	-7	-8	5	-3	4	13	-48	8	-9	3	3	-4
1	0	0	393	1781	3	-2	-4	1	-3	5	-2	-6	-3	-5	8	-8	-1	0	-1
1	0	1	4390	-3825	3	-2	-3	28	-55	5	-2	-5	-29	-47	8	-8	0	20	-29
1	0	2	214	-171	3	-2	-2	344	-642	5	-2	-4	-326	-520	8	-8	1	-10	17
1	0	3	12	-11	3	-2	-1	6467	-13330	5	-2	-3	-3872	-6254	8	-8	2	20	24
1	0	4	0	-1	3	-2	0	72	13370	5	-2	-2	-55808	-89984	8	-8	3	0	1
1	1	-5	-3	-1	3	-2	1	-58	-62938	5	-2	-1	-1184050	-1925009	8	-7	-1	-1	6
1	1	-4	4	1	3	-2	2	-230	-2700	5	-2	0	175765	247369	8	-7	0	11	8
1	1	-3	22	28	3	-2	3	-37	-270	5	-2	1	-62823	153228	8	-7	1	-23	-14
1	1	-2	-124	1005	3	-2	4	-3	-28	5	-2	2	-2912	7160	8	-7	2	27	4
1	1	-1	-1871	6563	3	-2	5	0	-1	5	-2	3	-201	500	8	-6	-2	-0	-1
1	1	0	225	-668	3	-1	-4	-2	-13	5	-2	4	-17	41	8	-6	-1	-16	-8
1	1	1	160	40	3	-1	-3	-31	-81	5	-2	5	-2	4	8	-6	0	-2	-6
1	1	2	6	9	3	-1	-2	-315	-1470	5	-1	-5	-5	4	8	-6	1	-13	37
1	2	-5	-4	-3	3	-1	-1	-5585	-23656	5	-1	-4	21	44	8	-6	2	-6	-1
1	2	-4	57	-4	3	-1	0	2097	3473	5	-1	-3	-115	322	8	-5	-2	2	-1
1	2	-3	41	-11	3	-1	1	-3376	-4018	5	-1	-2	-1786	5680	8	-5	-1	35	-15
1	2	-2	-17	-1202	3	-1	2	-143	-195	5	-1	-1	25239	12077	8	-5	0	-17	20
1	2	-1	-300	2429	3	-1	3	-13	-12	5	-1	0	-21243	-7395	8	-5	1	58	-79
1	2	0	-63	-589	3	-1	4	-1	-1	5	-1	1	-7212	4624	8	-5	2	-1	4
1	2	1	7	-49	3	0	-4	-3	1	5	-1	2	-369	172	8	-4	-2	-4	1
1	2	2	-0	-3	3	0	-3	-5	8	5	-1	3	-26	15	8	-4	-1	-83	21
1	3	-5	11	2	3	0	-2	154	523	5	-1	4	-3	6	8	-4	0	21	12
1	3	-4	4	-24	3	0	-1	239	5813	5	0	-6	-1	5	8	-4	1	-65	-105
1	3	-3	-120	-183	3	0	0	186	-1396	5	0	-5	-1	1	8	-4	2	-3	-5
1	3	-2	-199	-598	3	0	1	-7	-256	5	0	-4	-60	149	8	-3	-2	-17	-13
1	3	-1	-69	324	3	0	2	-4	-13	5	0	-3	-748	1912	8	-3	-1	-366	-284
1	3	0	16	-84	3	0	3	5	-0	5	0	-2	-12744	4758	8	-3	0	54	39
1	3	1	5	-10	3	1	-5	-4	-2	5	0	-1	-145988	68715	8	-3	1	-17	8
1	3	2	-0	-1	3	1	-4	12	-16	5	0	0	29994	-18134	8	-2	-5	3	-4

Table 3 (Cont.)

6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin
1	4	-6	3	-2	3	1	-3	5	-53	5	0	1	1835	-1417	8	-2	-4	1	9
1	4	-5	-4	-5	3	1	-2	-593	-711	5	0	2	102	-71	8	-2	-3	-162	-27
1	4	-4	-47	-10	3	1	-1	-601	-1372	5	0	3	12	-1	8	-2	-2	-2408	-984
1	4	-3	-76	-79	3	1	0	203	282	5	1	-7	0	3	8	-2	-1	-14094	4434
1	4	-2	-28	-188	3	1	1	10	14	5	1	-6	-2	-1	8	-2	0	2743	-965
1	4	-1	-8	36	3	2	-5	7	-0	5	1	-5	47	24	8	-2	1	233	-196
1	4	0	4	-8	3	2	-4	-10	-9	5	1	-4	263	272	8	-2	2	18	-6
1	5	-6	-4	-5	3	2	-3	-111	-14	5	1	-3	128	-915	8	-1	-1	-5	6
1	5	-5	-9	2	3	2	-2	461	11	5	1	-2	13554	-31683	8	-1	1	-5	6
1	5	-4	-17	-16	3	2	-1	-30	-271	5	1	-1	-23384	2431	9	-10	-1	4	-9
1	5	-3	-33	-5	3	2	0	9	76	5	1	0	6184	-487	9	-10	0	78	-194
1	5	-2	10	-48	3	2	1	1	5	5	1	1	394	-54	9	-10	1	-43	-22
1	5	-1	-2	7	3	3	-6	1	-3	5	1	2	26	-0	9	-10	2	226	348
1	5	0	1	-3	3	3	-5	-5	6	5	1	3	7	-0	9	-10	3	10	16
1	6	-3	-1	2	3	3	-4	-36	11	5	2	-7	9	5	9	-9	0	-4	-13
1	6	-2	-12	53	3	3	-3	51	-33	5	2	-6	2	-7	9	-9	1	-1	4
1	6	-1	2	-8	3	3	-2	96	125	5	2	-5	106	26	9	-9	2	9	-14
1	6	0	-0	1	3	3	-1	9	-40	5	2	-4	-43	-145	9	-6	-1	-0	-7
2	-9	2	4	-2	3	3	0	-5	9	5	2	-3	-604	-4722	9	-6	0	-2	1
2	-9	3	9	-7	3	4	-6	5	2	5	2	-2	9838	-6497	9	-6	1	16	4
2	-9	4	-14	-13	3	4	-5	-14	19	5	2	-1	-2843	-202	9	-5	-2	1	0
2	-9	5	7	-25	3	4	-4	-20	-18	5	2	0	715	256	9	-5	-1	29	-3
2	-9	6	17	-4	3	4	-3	16	36	5	2	1	44	11	9	-5	0	-6	-0
2	-9	7	3	-0	3	4	-2	-11	56	5	2	2	3	-0	9	-5	1	17	3
2	-9	8	-2	-3	3	4	-1	2	-8	5	3	-8	1	-1	9	-5	2	1	0
2	-8	0	1	-2	3	4	0	-1	2	5	3	-7	17	-13	9	-4	-2	-5	7
2	-8	1	-8	20	3	5	-4	2	-5	5	3	-6	28	-9	9	-4	-1	-99	140
2	-8	2	59	-134	3	5	-3	-2	2	5	3	-5	-45	-11	9	-4	0	15	-29
2	-8	3	-93	4	3	5	-2	-40	48	5	3	-4	-683	-646	9	-4	1	-7	65
2	-8	4	-37	-101	3	5	-1	6	-8	5	3	-3	624	-1345	9	-4	2	-0	3
2	-8	5	45	-91	4	-9	1	5	0	5	3	-2	2895	-84	9	-3	-2	-2	3
2	-8	6	21	-22	4	-9	2	-26	2	5	3	-1	-455	-98	9	-3	-1	-35	61
2	-8	7	-11	-2	4	-9	3	14	17	5	3	0	64	57	9	-3	0	5	-9
2	-7	-1	-0	11	4	-9	4	-12	12	5	3	1	5	3	9	-3	1	-2	4
2	-7	0	-7	242	4	-8	-1	-6	1	5	4	-9	3	-5	9	-2	-4	-1	14
2	-7	1	1151	-1113	4	-8	0	-120	28	5	4	-8	4	-4	9	-2	-3	-76	152
2	-7	2	-8273	7574	4	-8	1	385	307	5	4	-7	3	-2	9	-2	-2	-786	-711
2	-7	3	-898	144	4	-8	2	-2651	-2194	5	4	-6	-16	-5	9	-2	-1	-2322	294
2	-7	4	-48	-335	4	-8	3	-177	-25	5	4	-5	-216	-19	9	-2	0	505	-77
2	-7	5	7	-39	4	-8	4	-30	-29	5	4	-4	-80	-306	9	-2	1	45	-25
2	-7	6	-22	-3	4	-8	5	-1	-6	5	4	-3	265	-130	9	-2	2	3	-1
2	-7	7	-9	4	4	-8	6	9	11	5	4	-2	1203	628	10	-10	-1	-0	1
2	-6	-2	-0	1	4	-7	-1	6	1	5	4	-1	-170	-89	10	-10	0	-21	14
2	-6	-1	-8	21	4	-7	0	119	22	5	4	0	10	14	10	-10	1	5	2
2	-6	0	-152	347	4	-7	1	-208	-191	5	5	-8	-0	-10	10	-10	2	-16	-31
2	-6	1	1200	-768	4	-7	2	388	1413	5	5	-7	-17	10	10	-10	3	0	-1
2	-6	2	-8157	1907	4	-7	3	-121	83	5	5	-6	-47	23	10	-9	0	-2	-7
2	-6	3	-1464	-1403	4	-7	4	-30	1	5	5	-5	-65	-50	10	-9	2	2	7
2	-6	4	-91	-167	4	-7	5	0	11	5	5	-4	19	-53	10	-8	0	13	5
2	-6	5	-28	18	4	-7	6	11	-4	5	5	-3	36	-1	10	-8	1	-6	4
2	-6	6	-19	33	4	-6	-2	1	1	5	5	-2	-31	-40	10	-8	2	29	-31
2	-6	7	-1	1	4	-6	-1	15	13	5	5	-1	4	6	10	-7	-1	-6	-7
2	-5	-2	-3	10	4	-6	0	289	279	5	6	-9	-5	5	10	-7	0	5	-21
2	-5	-1	-106	79	4	-6	1	-640	-616	5	6	-8	-10	3	10	-7	1	-12	76
2	-5	0	-1832	1562	4	-6	2	-1458	939	5	6	-7	-7	22	10	-7	2	37	67
2	-5	1	6133	-3781	4	-6	3	-100	102	5	6	-6	-33	1	10	-7	3	3	15
2	-5	2	-18941	-5947	4	-6	4	27	18	5	6	-5	-8	-18	10	-6	-1	1	-2
2	-5	3	-1121	-646	4	-6	5	10	0	5	6	-4	-5	8	10	-6	0	57	32
2	-5	4	-7	164	4	-5	-2	-4	3	5	6	-3	-0	-2	10	-6	1	-244	-96
2	-5	5	-1	23	4	-5	-1	-52	30	6	-10	0	-5	1	10	-6	2	-18	8
2	-5	6	6	21	4	-5	0	-713	1027	6	-10	1	-0	-2	10	-6	3	-2	-4
2	-4	-3	-3	-0	4	-5	1	873	-3004	6	-10	2	5	14	10	-5	-2	-5	-6
2	-4	-2	-38	7	4	-5	2	224	164	6	-9	-1	2	1	10	-5	-1	-87	-1

Table 3 (Cont.)

6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin	6	5	4	cos	sin
2	-4	-1	-644	81	4	-5	3	82	-38	6	-9	0	34	23	10	-5	0	-18	23
2	-4	0	-11570	2584	4	-5	4	33	-22	6	-9	1	1	-64	10	-5	1	-20	-98
2	-4	1	39007	-15588	4	-5	5	1	-1	6	-9	2	-35	441	10	-5	2	-13	-14
2	-4	2	-639	-2141	4	-4	-3	0	-1	6	-9	3	8	33	10	-4	-3	-16	5
2	-4	3	805	410	4	-4	-2	8	-31	6	-8	-1	-1	-4	10	-4	-2	-233	55
2	-4	4	92	74	4	-4	-1	173	-518	6	-8	0	-32	-73	10	-4	-1	-4936	1391
2	-4	5	25	13	4	-4	0	32	-827	6	-8	1	-13	58	10	-4	0	655	-206
2	-3	-3	9	0	4	-4	1	-1652	-328	6	-8	2	379	104	10	-4	1	171	135
2	-3	-2	99	-36	4	-4	2	102	-491	6	-8	3	13	9	10	-4	2	15	6
2	-3	-1	1959	-308	4	-4	3	18	-65	6	-8	4	-1	-3	10	-3	-2	12	18
2	-3	0	2565	-9058	4	-4	4	2	-11	6	-7	-1	7	-1	10	-3	-1	28	-20
2	-3	1	14097	-7115	4	-3	-3	5	-1	6	-7	0	141	-33	10	-3	0	-27	31
2	-3	2	6933	-977	4	-3	-2	73	-2	6	-7	1	-157	63	10	-3	1	20	7
2	-3	3	592	42	4	-3	-1	1970	1120	6	-7	2	-33	258	10	-3	2	1	-0
2	-3	4	30	6	4	-3	0	-668	-656	6	-7	3	-3	39	10	-2	-5	5	-3
2	-3	5	9	1	4	-3	1	1263	3488	6	-7	4	4	-0	10	-2	-4	23	5
2	-2	-4	2	7	4	-3	2	3	27	6	-6	-2	-2	2	10	-2	-3	-36	76
2	-2	-3	29	95	4	-3	3	1	-1	6	-6	-1	-34	39	10	-2	-2	-160	-208
2	-2	-2	408	1390	4	-2	-4	-7	0	6	-6	0	27	183	10	-2	-1	-309	194
2	-2	-1	6935	33572	4	-2	-3	-97	-13	6	-6	1	-182	-326	10	-2	0	69	-20
2	-2	0	11151	-6951	4	-2	-2	-1226	-9	6	-6	2	40	-2	10	-2	1	13	-2
2	-2	1	-53845	6331	4	-2	-1	-30134	-121	6	-6	3	11	-13	10	-1	-3	-1	-1
2	-2	2	-3566	-35	4	-2	0	6536	1177	6	-6	4	1	-3	10	-1	-2	-41	-43
2	-2	3	-277	-58	4	-2	1	-24078	2101	6	-5	-2	-1	-1	10	-1	-1	0	20
2	-2	4	4	-7	4	-2	2	-1573	428	6	-5	-1	-65	-89	10	-1	0	1	-5
2	-2	5	2	0	4	-2	3	-106	9	6	-5	0	-92	-88	10	-1	1	-1	-1
2	-1	-4	21	12	4	-2	4	-4	6	6	-5	1	-113	133	10	0	-2	-4	-17
2	-1	-3	45	167	4	-1	-4	2	-10	6	-5	2	-68	-71	10	0	-1	1	3
2	-1	-2	901	2776	4	-1	-3	-35	-33	6	-5	3	-9	-14	10	0	0	-1	-6
2	-1	-1	559	43952	4	-1	-2	-557	-245	6	-5	4	-1	0	11	-4	-1	-9	31
2	-1	0	4669	119	4	-1	-1	-6527	-4580	6	-4	-3	1	-0	11	-4	0	4	-5
2	-1	1	-35956	-8120	4	-1	0	1108	876	6	-4	-2	2	-10	11	-4	1	-22	4
2	-1	2	-1705	-379	4	-1	1	303	-59	6	-4	-1	263	-48	11	-2	-5	-1	-4
2	-1	3	-114	-22	4	-1	2	7	-0	6	-4	0	-136	24	11	-2	-4	30	2
2	-1	4	-10	-2	4	0	-5	-1	0	6	-4	1	494	68	11	-2	-3	-25	15
2	0	-4	8	12	4	0	-4	-2	11	6	-4	2	-6	-15	11	-2	-2	-15	-58
2	0	-3	104	-9	4	0	-3	-42	33	6	-4	3	3	4	11	-2	-1	-37	-9
2	0	-2	-130	-127	4	0	-2	-30	94	6	-4	4	1	0	11	-2	0	10	2
2	0	-1	2484	-5705	4	0	-1	-987	1635	6	-3	-3	-8	-4	12	-5	-1	-10	24
2	0	0	-1202	293	4	0	0	186	-348	6	-3	-2	-9	-22	12	-5	0	1	-3
2	0	1	-317	252	4	0	1	4	-18	6	-3	-1	-447	-242	12	-4	-2	0	4
2	0	2	-18	15	4	1	-5	3	-6	6	-3	0	79	20	12	-4	-1	7	83
2	0	3	-1	1	4	1	-4	12	-2	6	-3	1	467	-148	12	-4	0	-1	-11
2	1	-6	-10	1	4	1	-3	18	-21	6	-3	2	27	4	12	-4	1	-1	-5
2	1	-5	-5	-4	4	1	-2	-30	-297	6	-3	3	3	-0	13	-4	-1	0	11
2	1	-4	14	-8	4	1	-1	-213	143	6	-2	-4	-1	-4	15	-6	-1	-6	10
2	1	-3	-101	52	4	1	0	49	-31	6	-2	-3	-42	-15	15	-6	1	6	-10

Table 4. Fourier representation of δx_2 (mixed part)

T measured from epoch in days.

The coefficients are in units of 10^{-19}.

The argument is $k\ell_4$, ℓ_4 mean anomaly of Mars.

k	cos	sin
1	0 T^2	-26 T^2
2	0 T^2	-2 T^2
0	313774 T	0 T
1	10849 T	-78999480 T
2	-102779 T	-8840577 T
3	-14383 T	-977485 T
4	-1786 T	-110676 T
5	-217 T	-12768 T
6	-26 T	-1493 T
7	-3 T	-176 T
8	0 T	-21 T
9	0 T	-3 T

Table 5. Fourier representation of δy_2 (mixed part)

T measured from epoch in days.
The coefficients are in units of 10^{-19}.
The argument is $k\ell_4$, ℓ_4 mean anomaly of Mars.

k	cos	sin
1	26 T^2	0 T^2
2	2 T^2	0 T^2
0	4512938 T	0 T
1	78686060 T	20653 T
2	8823289 T	-102322 T
3	976183 T	-14351 T
4	110563 T	-1784 T
5	12758 T	-216 T
6	1492 T	-26 T
7	176 T	-3 T
8	21 T	0 T
9	3 T	0 T

Table 6. Fourier representation of δz_2 (mixed part)

T measured from epoch in days.
The coefficients are in units of 10^{-19}.
The argument is $k\ell_4$, ℓ_4 mean anomaly of Mars.

k	cos	sin
0	658698 T	0 T
1	-4692988 T	873448 T
2	-218295 T	40658 T
3	-15234 T	2838 T
4	-1260 T	235 T
5	-115 T	21 T
6	-11 T	2 T
7	-1 T	0 T

Table 7. Comparison of numerical integration with the analytical solution. The values are expressed in units of 10^{10}

t (days)	Δx_2 Numerical integration	Δx_2 Analytical minus integration	Δy_2 Numerical integration	Δy_2 Analytical minus integration	Δz_2 Numerical integration	Δz_2 Analytical minus integration
120	5201	-0	41426	4	2731	-4
160	-1332	-1	41088	3	2469	-4
200	-4919	-2	36168	1	1988	-4
240	-4118	-1	28420	1	1329	-3
280	910	-1	20876	0	546	-2
320	6058	-3	16375	1	-286	-1
360	13981	-2	15724	-1	-1070	-0
400	16080	-1	16799	-2	-1691	1
440	14862	-2	15896	-3	-2040	2
480	14249	-1	11156	-2	-2043	3
520	18329	1	5014	-2	-1693	4
560	27357	3	2379	-2	-1057	3
600	37508	4	6372	-1	-254	2
640	44077	2	16291	-0	586	1
680	44331	2	28243	1	1349	-0
720	38156	0	40354	1	1948	-2
760	27264	1	48187	-1	2327	-3
800	14139	1	51130	0	2455	-3
840	1325	-1	49225	1	2323	-3
880	-8907	-2	43456	2	1942	-4
920	-14685	-1	35536	2	1347	-4
960	-14754	-1	27811	0	593	-3
1000	-9171	-1	23032	-2	-230	-2
1040	-358	-1	23482	-1	-1002	-1
1080	6917	-2	29163	-2	-1595	1
1120	8412	-0	36273	-2	-1901	2
1160	4689	0	38975	-1	-1859	2
1200	1555	0	34703	-3	-1479	3
1240	4649	1	27197	-1	-838	3
1280	14137	-0	23020	-0	-58	2
1320	25254	2	25938	-1	735	1
1360	32515	3	34957	0	1435	-0
1400	32905	2	46097	2	1966	-1
1440	26520	0	55012	1	2283	-2
1480	15652	-1	58711	0	2362	-3
1520	3459	-1	56167	1	2200	-4
1560	-7162	-1	48150	0	1812	-4
1600	-14332	-3	36658	3	1229	-4
1640	-17506	-2	24156	2	499	-3
1680	-17336	-3	12836	3	-310	-2
1720	-15088	-4	4170	-1	-1110	-1
1760	-11917	1	-1022	-0	-1792	1
1800	-8596	-0	-2327	0	-2236	2
1840	-5757	-0	-297	-4	-2327	2
1880	-3467	2	3012	-4	-2012	3
1920	-400	4	5848	1	-1337	3
1960	4934	3	8945	-1	-431	3
2000	11983	3	14515	-1	552	2
2040	18166	2	23587	-1	1471	1
2080	20747	2	34837	1	2223	-1
2120	18510	3	45326	3	2740	-1
2160	12298	3	51969	5	2985	-2
2200	4602	-0	52811	2	2944	-3
2240	-1369	-1	47753	1	2626	-3
2280	-2849	-0	38688	-1	2056	-3
2320	1338	0	28999	0	1284	-3
2360	9919	-1	22351	1	380	-2
2400	19167	-3	20814	-1	-556	-1
2440	24644	-1	23012	-1	-1402	0
2480	24326	-1	24096	-3	-2024	2
2520	21342	1	19348	-4	-2310	3
2560	21678	1	[illegible]451	2	-2206	3

t (days)	Δx_2 Numerical integration	Δx_2 Analytical minus integration	Δy_2 Numerical integration	Δy_2 Analytical minus integration	Δz_2 Numerical integration	Δz_2 Analytical minus integration
13440	7624	-0	18754	0	-915	-0
13480	9230	-1	21069	-1	-1595	-1
13520	7737	-1	20713	1	-2004	-1
13560	7229	0	16678	-0	-2063	-1
13600	10830	-1	11929	1	-1769	-1
13640	17850	1	10615	1	-1191	-1
13680	24829	-1	14645	1	-441	-0
13720	28364	1	22979	0	360	0
13760	26793	-0	32995	1	1106	0
13800	20261	1	41977	-1	1716	1
13840	10116	2	47878	-0	2133	1
13880	-1680	-0	49542	2	2322	1
13920	-12909	-0	46732	2	2265	1
13960	-21333	-2	40174	2	1964	1
14000	-24991	-1	31625	-0	1440	1
14040	-22789	0	23832	1	741	0
14080	-15515	-0	19990	1	-50	-0
14120	-6680	-0	22209	0	-819	-1
14160	-1435	-0	29329	1	-1439	-1
14200	-2756	-0	36319	0	-1797	-1
14240	-8155	-1	37744	-1	-1825	-1
14280	-11568	-1	32805	0	-1524	-1
14320	-9027	-2	25933	0	-964	-1
14360	-1599	-0	22452	1	-253	-1
14400	6532	-1	24697	1	495	0
14440	11360	0	31557	0	1178	0
14480	10858	1	40076	1	1721	1
14520	5144	1	47125	-1	2070	2
14560	-4147	0	50383	-1	2197	2
14600	-14593	1	48729	-0	2091	2
14640	-23625	1	42319	1	1759	2
14680	-29078	0	32525	-0	1228	1
14720	-29718	2	21739	-1	546	1
14760	-25734	3	12928	1	-219	0
14800	-19029	-0	8808	1	-970	-0
14840	-12909	1	10565	2	-1590	-1
14880	-10613	-0	16497	1	-1959	-1
14920	-12802	0	22127	1	-1984	-1
14960	-16209	2	23535	1	-1651	-1
15000	-16208	-0	21168	1	-1026	-1
15040	-11093	-3	19096	1	-228	-1
15080	-3160	4	20976	-0	614	-0
15120	3601	-1	27492	0	1387	0
15160	6123	-0	36595	-1	2008	1
15200	3451	-1	45069	-0	2417	2
15240	-3318	-0	50010	1	2581	2
15280	-11717	0	49750	1	2488	2
15320	-18785	-1	44250	1	2143	2
15360	-21974	-1	35091	-1	1575	2
15400	-20035	-1	25064	0	833	1
15440	-13707	1	17254	-0	-5	1
15480	-5731	-1	13576	0	-835	-0
15520	467	-1	13374	-1	-1534	-1
15560	3230	1	13613	2	-1979	-2
15600	4076	-1	11618	-0	-2085	-2
15640	5737	-1	7978	-2	-1839	-2
15680	9060	0	5862	-1	-1310	-1
15720	12905	-1	7883	0	-616	-1
15760	15766	-1	14675	-0	119	-0
15800	16207	-0	25468	-0	798	0
15840	12823	0	38609	-2	1356	1
15880	4671	1	51707	0	1749	1

t (days)	Δx_2 Numerical integration	Δx_2 Analytical minus integration	Δy_2 Numerical integration	Δy_2 Analytical minus integration	Δz_2 Numerical integration	Δz_2 Analytical minus integration
26760	20949	-0	21369	0	-342	-0
26800	22751	1	29497	-1	447	2
26840	19404	1	37994	1	1179	4
26880	11634	1	44340	0	1777	6
26920	1127	1	46970	2	2184	7
26960	-10053	1	45359	1	2360	8
27000	-19805	1	39931	-1	2281	8
27040	-26176	1	31990	-1	1941	7
27080	-27599	-0	23734	-1	1359	5
27120	-23559	2	18159	0	590	2
27160	-15816	1	18276	1	-268	-1
27200	-8998	1	25088	1	-1080	-3
27240	-8323	1	35348	2	-1702	-5
27280	-14873	-1	42411	0	-2014	-6
27320	-23658	-1	41466	0	-1962	-6
27360	-27901	-1	33862	2	-1569	-6
27400	-24785	-2	25347	-1	-919	-4
27440	-16573	-1	21022	-1	-128	-2
27480	-7760	-0	22446	-1	688	1
27520	-2046	1	27975	1	1431	4
27560	-987	0	34485	2	2026	6
27600	-4015	1	38968	1	2417	7
27640	-9128	-1	39527	-0	2569	8
27680	-13770	2	35808	-1	2464	8
27720	-15708	1	29015	-1	2103	7
27760	-13833	2	21528	1	1507	6
27800	-8736	-1	16105	-1	724	4
27840	-2743	4	14715	3	-167	1
27880	948	-2	17406	-1	-1054	-2
27920	18	0	21988	1	-1799	-5
27960	-5288	1	25130	1	-2262	-6
28000	-12039	-1	24449	2	-2348	-6
28040	-16504	-3	20212	0	-2041	-5
28080	-16634	-1	15065	-1	-1408	-4
28120	-13052	-2	11993	0	-568	-2
28160	-8108	-1	12500	-1	353	1
28200	-4286	-1	16200	-2	1236	3
28240	-3125	-0	21432	-1	1988	5
28280	-4858	-1	26136	0	2536	7
28320	-8541	1	28598	0	2831	8
28360	-12441	-0	27976	0	2842	8
28400	-14595	1	24616	-1	2561	7
28440	-13517	0	20116	-1	2002	6
28480	-9000	3	16983	1	1211	4
28520	-2745	-0	17671	0	267	1
28560	1804	1	23010	1	-709	-2
28600	1131	-0	30828	-1	-1568	-5
28640	-5544	0	36491	2	-2158	-7
28680	-14867	-1	36146	0	-2372	-7
28720	-21621	-2	29971	2	-2185	-7
28760	-22648	-1	21842	-1	-1653	-5
28800	-18460	-1	16131	3	-889	-3
28840	-11969	-1	15152	0	-16	1
28880	-6424	-2	18661	-1	850	3
28920	-3976	-1	24681	-1	1616	5
28960	-5160	-0	30611	1	2208	7
29000	-8994	1	34187	-1	2574	8
29040	-13426	-0	34165	1	2680	8
29080	-16002	1	30751	-2	2512	8
29120	-14729	0	25740	-0	2074	7
29160	-9098	0	22167	-1	1401	4
29200	-985	1	23183	-0	558	1

Table 7 (Cont.)

t (days)	Δx_2 Numerical integration	Δx_2 Analytical minus integration	Δy_2 Numerical integration	Δy_2 Analytical minus integration	Δz_2 Numerical integration	Δz_2 Analytical minus integration	t (days)	Δx_2 Numerical integration	Δx_2 Analytical minus integration	Δy_2 Numerical integration	Δy_2 Analytical minus integration	Δz_2 Numerical integration	Δz_2 Analytical minus integration	t (days)	Δx_2 Numerical integration	Δx_2 Analytical minus integration	Δy_2 Numerical integration	Δy_2 Analytical minus integration	Δz_2 Numerical integration	Δz_2 Analytical minus integration
2600	21323	4	931	-1	-1745	3	15920	-8131	-0	61950	-1	1952	2	29240	5383	-0	30066	-0	-353	-2
2640	37310	1	-2	1	-1036	3	15960	-24061	-1	66719	-1	1954	2	29280	5406	-2	40284	-2	-1197	-4
2680	43726	1	7623	-1	-218	2	16000	-40239	0	64346	-2	1757	3	29320	-2184	-1	47909	-2	-1828	-6
2720	44734	1	20786	1	583	1	16040	-52890	-1	54873	0	1377	3	29360	-13159	-0	47734	-1	-2130	-7
2760	39837	-0	35741	1	1271	-0	16080	-58308	-1	40632	-0	845	2	29400	-20641	-0	39832	-0	-2056	-7
2800	30000	2	49433	-1	1786	-1	16120	-54391	-1	26281	0	214	1	29440	-20685	-1	29777	0	-1639	-6
2840	16436	2	59520	3	2093	-2	16160	-42459	-0	17637	-1	-441	-0	29480	-14598	0	21572	-0	-971	-3
2880	1156	0	64236	5	2176	-3	16200	-28107	-2	18741	-2	-1026	-1	29520	-6701	-1	19114	0	-174	-1
2920	-13305	-0	62875	1	2038	-3	16240	-18999	-0	28201	-1	-1437	-2	29560	-1070	-1	21121	-0	630	2
2960	-24052	-0	55719	2	1694	-3	16280	-19183	-1	38615	-2	-1592	-2	29600	147	-1	25405	-1	1331	5
3000	-28465	-1	44914	0	1175	-3	16320	-24849	2	42125	-2	-1454	-2	29640	-3287	-1	29801	-2	1852	7
3040	-25265	-1	34192	0	530	-2	16360	-27653	-1	37487	1	-1048	-2	29680	-10446	-0	32626	-0	2145	8
3080	-15747	1	28037	0	-172	-1	16400	-22640	-0	30256	0	-445	-1	29720	-19860	-0	32643	1	2192	8
3120	-4394	0	29593	0	-839	-0	16440	-11736	0	26600	-0	262	-0	29760	-29721	1	29057	-2	1994	8
3160	2573	0	37898	1	-1368	1	16480	-728	0	28534	1	972	1	29800	-37931	1	21732	-1	1568	7
3200	1403	-1	46937	1	-1659	2	16520	5372	-0	34130	-0	1588	1	29840	-42302	-2	11572	-1	954	5
3240	-5056	-1	49448	-0	-1648	3	16560	4644	-0	40190	0	2020	2	29880	-41224	-1	830	-0	216	2
3280	-8880	-1	43541	-1	-1331	3	16600	-2100	0	44149	1	2216	2	29920	-34752	1	-7175	-0	-551	-1
3320	-4342	1	34545	-2	-767	3	16640	-12776	-0	44516	-0	2155	3	29960	-25487	1	-9499	0	-1231	-4
3360	7155	0	29551	1	-50	2	16680	-25100	0	40627	-0	1850	3	30000	-17831	-0	-5824	3	-1704	-6
3400	19238	-0	31428	1	706	1	16720	-36927	0	32371	0	1331	2	30040	-15039	-0	637	-0	-1879	-7
3440	25876	-1	38057	1	1399	1	16760	-46175	-2	20151	1	651	2	30080	-16512	-0	5515	-2	-1727	-7
3480	24660	-3	45388	-2	1920	-0	16800	-50782	-1	5123	-1	-120	1	30120	-18646	-1	6979	1	-1289	-6
3520	16730	-3	50213	-3	2201	-1	16840	-49066	0	-10409	1	-887	-0	30160	-18293	-4	6676	1	-650	-4
3560	4926	-0	51005	-3	2210	-2	16880	-40710	1	-22974	1	-1537	-1	30200	-14981	-1	7577	-2	83	-1
3600	-7841	-1	47536	-1	1954	-2	16920	-27898	1	-29036	1	-1954	-1	30240	-10495	-0	11523	-1	816	2
3640	-19259	-2	40329	-0	1468	-3	16960	-15098	1	-27265	-0	-2046	-2	30280	-7198	-0	18236	-2	1471	5
3680	-27644	-3	30338	-0	803	-3	17000	-6445	-0	-19971	1	-1788	-2	30320	-6586	-0	25699	-1	1991	7
3720	-31841	-3	18904	1	33	-2	17040	-2774	-0	-11344	0	-1227	-2	30360	-8642	-0	31717	-2	2335	9
3760	-31314	-4	7802	-1	-752	-1	17080	-1788	-2	-3973	0	-467	-2	30400	-11999	1	32666	-0	2475	9
3800	-26484	-2	-900	0	-1441	-0	17120	-933	-1	2466	-1	367	-1	30440	-14672	-0	29515	1	2389	8
3840	-19043	-0	-5485	-2	-1918	1	17160	475	0	9646	-0	1162	0	30480	-14973	1	23088	2	2070	7
3880	-11583	1	-5642	-1	-2085	2	17200	1375	-1	18486	-2	1835	2	30520	-12313	1	15871	2	1532	5
3920	-6103	0	-2963	-2	-1894	2	17240	293	-2	28205	-2	2332	3	30560	-7539	1	10234	0	812	2
3960	-2528	2	297	-1	-1371	2	17280	-3408	1	36614	-0	2623	3	30600	-2527	-2	7229	-1	-13	-1
4000	839	2	3322	-2	-613	2	17320	-8996	-0	41177	-0	2690	3	30640	1042	-1	6093	0	-834	-4
4040	5202	2	7224	1	248	1	17360	-14625	0	40328	-1	2528	3	30680	3032	1	5054	1	-1518	-6
4080	9985	-1	13507	0	1084	1	17400	-18121	-1	34410	-1	2136	3	30720	4985	1	3172	1	-1941	-8
4120	13395	-0	22416	1	1798	0	17440	-17953	1	25621	-1	1535	3	30760	8482	-1	1444	2	-2031	-8
4160	13305	-1	32446	1	2324	-1	17480	-14045	1	17018	0	768	2	30800	13413	-2	1839	2	-1786	-6
4200	10808	1	40932	1	2631	-1	17520	-7976	1	11075	1	-89	0	30840	18082	-3	5477	1	-1271	-4
4240	5502	1	45163	1	2704	-2	17560	-2226	0	8444	0	-932	-1	30880	20566	-1	11958	-0	-584	-1
4280	34	1	43619	1	2540	-2	17600	1439	-1	7702	1	-1631	-2	30920	19710	1	19921	1	172	2
4320	-3306	-0	36841	2	2144	-2	17640	3382	-0	6675	0	-2060	-2	30960	15287	1	27809	1	900	5
4360	-3074	-2	27315	1	1538	-2	17680	5722	0	4650	1	-2136	-3	31000	7742	1	34282	1	1523	7
4400	582	-1	18275	-0	768	-2	17720	10109	-1	3189	-1	-1849	-3	31040	-2024	1	38309	0	1982	9
4440	5932	-0	12081	-1	-93	-1	17760	16035	1	4575	-0	-1265	-2	31080	-12707	2	39185	-3	2231	10
4480	10087	-1	8921	-1	-941	-0	17800	21347	0	9840	-1	-495	-1	31120	-22531	2	36630	0	2743	10
4520	11850	1	6665	-1	-1653	0	17840	23835	-2	18269	-0	337	-0	31160	-29283	-0	31093	0	2009	8
4560	12402	1	2590	-1	-2103	1	17880	22245	-0	28086	-1	1122	1	31200	-30781	1	24160	-0	1543	6
4600	15292	1	-3672	-2	-2197	2	17920	16453	1	37277	1	1774	2	31240	-26124	1	18723	-0	891	3
4640	23041	1	-8866	-3	-1911	3	17960	7259	-0	44085	3	2233	3	31280	-17266	-0	18126	0	132	-0
4680	34245	0	-8659	-2	-1305	2	18000	-3840	-1	47244	-1	2459	3	31320	-9227	1	23796	2	-627	-3
4720	44502	0	-1344	-0	-494	2	18040	-14798	2	46130	0	2432	3	31360	-7271	-0	32840	3	-1267	-6
4760	49696	1	11242	-1	383	1	18080	-23187	1	40974	2	2153	3	31400	-12377	-1	39049	0	-1676	-8
4800	48090	1	25493	-1	1203	1	18120	-26630	-1	33131	1	1646	2	31440	-19792	0	38009	-1	-1782	-8
4840	40240	2	38057	0	1874	-0	18160	-23770	-2	25193	-0	963	2	31480	-23254	-1	31039	2	-1579	-7
4880	26191	2	46783	2	2330	-1	18200	-15597	-0	20455	-1	181	1	31520	-20247	-1	23417	2	-1121	-5
4920	14184	0	50775	0	2536	-2	18240	-6007	1	21199	0	-597	-0	31560	-12891	-2	19743	1	-497	-2
4960	631	-1	50037	-0	2478	-2	18280	-68	1	26410	1	-1259	-1	31600	-5272	-1	21380	-1	196	1
5000	-10172	1	45480	-1	2163	-2	18320	-234	-1	31487	-1	-1694	-2	31640	-739	1	26830	-1	870	4
5040	-16045	1	38352	-2	1619	-1	18360	-3813	-0	31792	-2	-1826	-3	31680	-738	-2	33286	-3	1452	7
5080	-15408	-1	30912	1	900	-1	18400	-5276	1	27117	-0	-1637	-3	31720	-4875	0	38011	-0	1883	8

Table 7 (Cont.)

t (days)	Δx_2 Numerical integration	Δx_2 Analytical minus integration	Δy_2 Numerical integration	Δy_2 Analytical minus integration	Δz_2 Numerical integration	Δz_2 Analytical minus integration
5120	-9406	-3	26145	1	91	-1
5160	1942	-2	26856	-1	-704	-1
5200	9767	-0	33330	-1	-1369	0
5240	10709	-1	41644	-1	-1793	1
5280	5348	-1	45120	-3	-1898	2
5320	98	2	40618	-2	-1660	2
5360	1400	2	31795	-0	-1130	2
5400	9943	1	25694	-2	-411	1
5440	21007	1	26716	-1	373	1
5480	28359	3	34342	-1	1109	0
5520	30156	0	44808	0	1712	-1
5560	24690	-0	53763	0	2124	-1
5600	14526	0	58048	3	2310	-2
5640	2719	1	56369	0	2258	-2
5680	-7774	0	49237	2	1973	-2
5720	-14849	1	38516	2	1474	-1
5760	-17630	-0	26782	1	800	-0
5800	-16501	-0	16657	0	7	0
5840	-12802	-2	10234	1	-823	0
5880	-8427	-2	8623	-1	-1578	1
5920	-5464	-0	11336	-2	-2119	1
5960	-5390	2	15773	-0	-2318	2
6000	-7474	-0	18377	1	-2109	2
6040	-8621	-1	17667	-0	-1524	1
6080	-6173	2	15651	-1	-677	1
6120	-436	-1	15676	-1	285	0
6160	5861	-1	19504	-1	1219	-0
6200	9755	-0	26393	-1	2014	-1
6240	9670	0	33973	1	2590	-1
6280	5841	1	39586	1	2899	-1
6320	-58	-0	41333	2	2921	-1
6360	-5628	-1	38643	1	2656	-2
6400	-8573	-1	32439	-0	2127	-1
6440	-7513	-0	24902	-0	1379	-1
6480	-2668	-2	18803	0	480	-0
6520	3898	-3	16353	1	-473	0
6560	8939	-2	17848	-2	-1358	1
6600	9858	1	21026	2	-2039	1
6640	6816	-1	22371	-2	-2391	1
6680	2920	-1	20087	-0	-2345	1
6720	1691	0	15749	-3	-1910	1
6760	4384	3	12701	0	-1174	1
6800	9588	-1	13475	0	-269	1
6840	14557	0	18601	-1	667	1
6880	16799	-1	26727	-2	1516	0
6920	15092	0	35417	1	2189	0
6960	9751	1	42107	0	2629	-0
7000	2389	0	44890	3	2801	-1
7040	-4605	-1	43043	2	2695	-1
7080	-6753	0	37291	0	2320	-1
7120	-8280	-0	29774	-0	1708	-0
7160	-2975	-2	23572	-1	913	-0
7200	5203	-2	21598	-0	20	-0
7240	12378	-3	24889	-1	-862	-0
7280	14636	-2	31115	-3	-1600	0
7320	11201	-1	35701	-4	-2062	1
7360	6076	1	33123	-4	-2157	1
7400	5039	1	25936	-2	-1867	1
7440	10223	-0	18963	-1	-1257	1
7480	18475	1	16961	-2	-455	0
7520	24719	1	[illegible]	-1	390	-0
7560	25667	1	29765	-1	1140	-1
7600	[illegible]	1	[illegible]	1	1700	-0

t (days)	Δx_2 Numerical integration	Δx_2 Analytical minus integration	Δy_2 Numerical integration	Δy_2 Analytical minus integration	Δz_2 Numerical integration	Δz_2 Analytical minus integration
18440	-1456	0	21752	0	-1176	-2
18480	6181	-1	20351	1	-536	-1
18520	13580	-1	24591	1	177	-0
18560	17110	-1	33010	1	863	1
18600	15085	-1	42580	1	1445	2
18640	7798	0	50236	-1	1866	3
18680	-3082	0	53750	1	2087	3
18720	-15188	-2	52067	-1	2088	4
18760	-26008	2	45353	-2	1865	4
18800	-33321	-0	34924	-0	1431	3
18840	-35607	0	23139	1	818	2
18880	-32509	-1	13161	-0	84	1
18920	-25392	2	8292	1	-680	-0
18960	-17616	1	10350	1	-1350	-1
19000	-13360	0	17477	1	-1791	-2
19040	-14261	-0	24201	1	-1900	-3
19080	-17063	-1	25902	1	-1656	-3
19120	-16596	-2	23191	1	-1116	-2
19160	-10878	0	20685	-1	-389	-1
19200	-2317	1	22406	-0	403	-0
19240	4890	0	29078	2	1151	1
19280	7561	-0	38499	-0	1773	2
19320	4758	1	47245	0	2209	3
19360	-2320	-1	52245	-0	2423	4
19400	-11097	1	51740	-1	2398	4
19440	-18559	-1	45685	-0	2135	4
19480	-22207	-0	35686	2	1653	4
19520	-20910	-0	24492	1	992	3
19560	-15441	1	14991	1	216	1
19600	-8265	-0	8862	0	-585	-0
19640	-2183	0	5608	1	-1300	-2
19680	1613	0	3209	-3	-1813	-3
19720	4119	2	521	1	-2036	-3
19760	6768	0	-1266	1	-1936	-3
19800	9941	-1	-217	1	-1545	-3
19840	13302	1	4502	-2	-943	-2
19880	16081	-0	12840	1	-228	-1
19920	16925	-1	24233	-0	501	1
19960	14289	0	37323	-1	1164	2
20000	7241	1	49876	-0	1697	3
20040	-3898	-1	59247	1	2054	4
20080	-17352	-0	63134	-2	2205	4
20120	-30134	1	60383	1	2136	4
20160	-38712	-1	51657	1	1849	4
20200	-40125	1	39801	0	1364	3
20240	-33481	0	29489	0	723	2
20280	-21351	-1	25627	0	-5	0
20320	-9752	-1	30387	-1	-721	-1
20360	-5106	0	40425	-1	-1308	-3
20400	-8899	0	47935	-3	-1658	-4
20440	-15402	-0	46921	-2	-1701	-4
20480	-16776	1	38734	-1	-1432	-4
20520	-10379	0	30025	-0	-906	-3
20560	-34	0	26263	-1	-221	-1
20600	8407	1	28482	-1	504	0
20640	11237	-1	34537	-1	1155	1
20680	7768	-0	41433	0	1649	2
20720	-812	0	46624	-0	1938	4
20760	-12546	1	48349	0	2002	5
20800	-25193	-0	45631	-0	1840	5
20840	-36361	1	38317	-1	1469	4
20880	-43671	-0	27282	-1	924	3
20920	-45219	1	14661	-1	259	2

t (days)	Δx_2 Numerical integration	Δx_2 Analytical minus integration	Δy_2 Numerical integration	Δy_2 Analytical minus integration	Δz_2 Numerical integration	Δz_2 Analytical minus integration
31760	-11485	1	39144	1	2124	9
31800	-18326	-0	36056	1	2147	10
31840	-23217	-0	29397	2	1939	9
31880	-24629	-1	20933	0	1507	7
31920	-22197	3	13152	1	878	4
31960	-17042	-1	8591	1	110	0
32000	-11692	-3	8836	0	-703	-3
32040	-9237	1	13340	1	-1431	-6
32080	-11538	-0	18934	2	-1932	-8
32120	-17373	-1	21536	-0	-2102	-8
32160	-22867	-4	19408	3	-1911	-7
32200	-24559	-2	14440	1	-1408	-5
32240	-21807	1	10160	1	-692	-2
32280	-16519	-1	9119	1	125	1
32320	-11450	-1	11794	-0	933	4
32360	-8743	0	16948	1	1645	6
32400	-9271	-2	22510	-1	2189	8
32440	-12573	0	26426	-2	2513	9
32480	-17134	-0	27310	1	2584	10
32520	-20871	-2	24892	0	2388	9
32560	-21803	0	20262	-0	1930	7
32600	-18905	-0	15763	0	1244	4
32640	-13006	1	14278	2	397	1
32680	-7135	-2	17693	-0	-505	-2
32720	-5376	0	25046	2	-1327	-5
32760	-9988	0	32135	-0	-1925	-8
32800	-18942	-1	34183	3	-2190	-9
32840	-27028	-3	29753	-0	-2083	-8
32880	-29891	-1	21724	0	-1643	-6
32920	-26807	-0	14652	-1	-962	-3
32960	-20198	0	11696	1	-152	0
33000	-13478	-1	13443	-0	677	3
33040	-9275	-1	18415	0	1432	7
33080	-8660	0	24184	-2	2037	9
33120	-11137	1	28393	-2	2436	10
33160	-15027	2	29494	-3	2589	10
33200	-18060	1	27226	-0	2477	10
33240	-18152	1	22813	-0	2097	8
33280	-14329	0	18778	1	1475	5
33320	-7625	-2	18096	-1	670	2
33360	-1333	0	22531	-1	-224	-1
33400	336	0	30747	-1	-1076	-5
33440	-4653	0	38057	0	-1739	-7
33480	-13690	0	39451	1	-2091	-8
33520	-21112	-1	33843	3	-2074	-8
33560	-22887	-2	24762	1	-1711	-6
33600	-19247	-1	16963	-1	-1088	-3
33640	-13301	-3	13245	-1	-326	-0
33680	-8354	-2	13937	-4	453	3
33720	-6479	1	17854	-3	1148	6
33760	-8468	1	23170	-3	1688	9
33800	-14165	0	27891	-0	2031	10
33840	-22616	0	30157	-0	2149	11
33880	-32093	2	28583	1	2034	10
33920	-40215	1	22713	-0	1691	8
33960	-44399	2	13527	-0	1148	5
34000	-42820	1	3718	0	456	2
34040	-35767	1	-2830	1	-301	-2
34080	-26567	2	-2937	1	-1012	-5
34120	-20432	0	3195	2	-1556	-8
34160	-20770	-1	11140	1	-1828	-9
34200	-26045	0	15448	-2	-1781	-8
34240	-31147	1	14712	-0	-1435	-7

Table 7 (Cont.)

t (days)	Δx_2 Numerical integration	Δx_2 Analytical minus integration	Δy_2 Numerical integration	Δy_2 Analytical minus integration	Δz_2 Numerical integration	Δz_2 Analytical minus integration
7640	10372	0	45989	1	2022	-1
7680	-2271	1	51209	1	2094	-1
7720	-17214	-0	52226	1	1927	-1
7760	-31762	-1	48210	1	1547	-1
7800	-43520	-1	39171	-1	995	-1
7840	-49907	-1	26407	1	329	-0
7880	-49180	-1	12782	0	-374	-0
7920	-41565	0	2234	-1	-1022	-0
7960	-30176	1	-1582	1	-1512	-0
8000	-20133	0	1599	-1	-1751	0
8040	-15226	-0	8169	-4	-1683	1
8080	-14697	1	13162	-2	-1315	1
8120	-14221	1	14613	1	-717	1
8160	-10353	0	14899	-1	7	0
8200	-3337	2	17583	-0	748	0
8240	3843	3	24086	1	1418	-0
8280	8031	2	32802	1	1955	-0
8320	7711	1	40357	1	2313	-0
8360	3382	0	43649	1	2459	-1
8400	-3085	1	41383	2	2368	-1
8440	-9503	-1	34287	2	2034	-1
8480	-14320	-0	24233	1	1481	-1
8520	-17020	1	13068	-0	755	-0
8560	-17788	-1	1827	-0	-66	-0
8600	-16693	-1	-9390	-2	-884	-0
8640	-12939	1	-20677	-1	-1577	-0
8680	-5067	1	-31011	-1	-2022	-0
8720	7438	1	-37612	-1	-2129	0
8760	22470	0	-37367	-0	-1870	0
8800	35858	1	-29382	-0	-1300	0
8840	43972	-1	-15755	-0	-530	0
8880	45520	-2	85	-0	311	0
8920	41237	-0	15300	-2	1105	0
8960	32659	0	28266	-1	1761	-0
9000	21322	1	38201	1	2220	0
9040	8651	0	44602	-1	2450	0
9080	-3736	1	46987	-3	2439	-0
9120	-13753	1	45050	-1	2198	-0
9160	-19051	-1	39221	2	1753	-0
9200	-17954	1	31311	0	1148	-0
9240	-10816	-1	24521	1	445	-0
9280	-755	-1	21961	-0	-282	-0
9320	7391	-2	24121	0	-941	-0
9360	10228	-2	27591	-3	-1435	-0
9400	9072	-0	27475	-3	-1675	0
9440	9298	2	22349	-3	-1618	0
9480	15111	0	16230	0	-1279	0
9520	25467	-1	14779	1	-733	-0
9560	35473	-0	20463	-0	-80	0
9600	40409	1	31533	-1	581	0
9640	36160	1	44059	1	1166	-0
9680	29294	-0	54213	-1	1613	-1
9720	16021	0	59481	2	1882	-0
9760	1121	2	58922	3	1949	1
9800	-12787	0	52937	1	1805	1
9840	-23613	-1	42899	2	1457	1
9880	-29911	-1	30546	1	927	1
9920	-30931	1	19304	0	258	0
9960	-26871	-2	11071	-0	-478	0
10000	-19535	-3	8487	-3	-1173	0
10040	-12596	-0	11896	-1	-1693	-0
10080	-9625	0	17674	-3	-1921	-0
10120	-10616	-0	21789	-0	-1799	0

t (days)	Δx_2 Numerical integration	Δx_2 Analytical minus integration	Δy_2 Numerical integration	Δy_2 Analytical minus integration	Δz_2 Numerical integration	Δz_2 Analytical minus integration
20960	-40458	0	3750	1	-447	0
21000	-31181	-0	-1959	-0	-1094	-1
21040	-21564	-1	-818	-1	-1571	-3
21080	-16015	1	5127	1	-1783	-4
21120	-15699	-1	11084	1	-1681	-4
21160	-17507	-1	13537	0	-1286	-4
21200	-17228	-1	13093	-0	-674	-2
21240	-13252	-0	13099	0	53	-1
21280	-7180	0	16340	-0	792	1
21320	-1993	1	23107	0	1463	2
21360	-33	1	31355	1	2004	3
21400	-1991	-1	38033	1	2369	4
21440	-6901	-1	40645	-1	2521	5
21480	-12745	-1	38278	-1	2432	5
21520	-17311	-1	31722	0	2097	5
21560	-19001	-0	22933	1	1533	4
21600	-17355	-1	14271	1	787	3
21640	-13169	1	7745	-0	-64	1
21680	-8134	1	4315	0	-911	-1
21720	-3979	1	3517	1	-1620	-2
21760	-1402	1	3846	-1	-2062	-3
21800	378	0	3988	1	-2148	-4
21840	2763	0	3973	1	-1865	-4
21880	6340	0	5043	-0	-1276	-3
21920	10310	-1	8458	-1	-493	-2
21960	13091	-1	14519	-1	359	0
22000	13251	0	22432	-0	1168	2
22040	10089	-1	30698	-2	1845	3
22080	3841	-1	37588	-3	2327	5
22120	-4320	-0	41545	0	2574	5
22160	-12397	-1	41557	1	2567	5
22200	-17907	-2	37566	0	2307	5
22240	-18661	-1	30869	-1	1818	4
22280	-13933	2	24176	-1	1145	3
22320	-5454	2	20714	0	355	1
22360	2783	-1	22218	-0	-461	-1
22400	6583	-1	27038	-0	-1191	-3
22440	4812	-0	30657	-0	-1716	-4
22480	899	-0	29383	-1	-1940	-5
22520	23	-1	23984	-0	-1827	-4
22560	4450	1	18950	0	-1413	-4
22600	12092	1	18398	0	-781	-2
22640	18848	-1	23321	-1	-41	-1
22680	21424	0	31851	-1	705	1
22720	18562	-1	40932	-0	1369	3
22760	10869	-0	47762	-2	1881	4
22800	124	0	50515	-1	2194	5
22840	-11404	-1	48527	0	2276	6
22880	-21434	-1	42230	0	2111	5
22920	-27979	-0	33045	1	1705	4
22960	-29632	2	23302	1	1085	3
23000	-26041	0	16062	-1	309	1
23040	-18719	3	14335	1	-522	-0
23080	-11558	1	19169	2	-1269	-2
23120	-9122	1	27594	-1	-1787	-4
23160	-12435	-0	33584	2	-1973	-5
23200	-17121	-1	33081	1	-1795	-5
23240	-17508	0	27793	-1	-1304	-4
23280	-11857	2	23087	0	-601	-2
23320	-2997	1	23130	1	196	-1
23360	4640	1	28462	1	976	1
23400	7848	2	36674	3	1652	3
23440	5759	0	44280	2	2159	5

t (days)	Δx_2 Numerical integration	Δx_2 Analytical minus integration	Δy_2 Numerical integration	Δy_2 Analytical minus integration	Δz_2 Numerical integration	Δz_2 Analytical minus integration
34280	-31872	-2	10012	1	-861	-4
34320	-27639	-0	7000	1	-155	-1
34360	-20814	0	7772	0	590	3
34400	-14544	0	12259	1	1291	6
34440	-11023	0	18377	2	1883	9
34480	-10814	1	23420	-0	2306	10
34520	-13017	-1	25380	-1	2515	11
34560	-15887	1	23648	-1	2476	10
34600	-17608	1	18995	-2	2177	9
34640	-16990	3	13125	-2	1631	6
34680	-13929	3	8054	0	881	3
34720	-9516	4	5382	2	10	-1
34760	-5627	2	5547	1	-865	-5
34800	-3905	-1	7461	0	-1601	-8
34840	-4580	-1	9145	2	-2043	-10
34880	-6258	-0	9227	2	-2169	-9
34920	-7109	-1	7975	2	-1915	-8
34960	-6278	-2	6861	0	-1367	-5
35000	-4239	-2	7367	1	-628	-2
35040	-2262	-4	10168	-3	188	1
35080	-1691	-2	14954	-3	981	5
35120	-3416	-0	20643	-1	1667	8
35160	-7560	0	25741	1	2182	10
35200	-13333	-1	28769	1	2477	11
35240	-19071	-0	28740	-0	2524	10
35280	-22582	-1	25669	0	2309	9
35320	-21968	0	20978	0	1845	6
35360	-16826	-0	17429	-0	1169	3
35400	-9233	1	17996	0	349	-1
35440	-3451	2	23485	2	-511	-4
35480	-3547	0	31808	4	-1279	-7
35520	-9961	-1	37076	2	-1821	-9
35560	-18493	-2	35738	1	-2041	-9
35600	-23649	-1	28771	1	-1912	-8
35640	-22895	-1	20613	1	-1481	-5
35680	-17607	-1	15471	1	-836	-2
35720	-11098	-1	15069	0	-84	1
35760	-6423	-1	18697	1	675	5
35800	-5290	-1	24293	-0	1355	7
35840	-7905	-0	29492	-3	1889	10
35880	-13248	1	32327	0	2224	11
35920	-19471	0	31687	2	2325	11
35960	-24365	1	27616	1	2176	10
36000	-25941	1	21493	-2	1777	8
36040	-23198	3	15930	-2	1156	5
36080	-17010	0	14082	1	376	0
36120	-10616	1	17994	-1	-460	-4
36160	-8537	1	26425	1	-1217	-7
36200	-13255	-0	34369	1	-1755	-9
36240	-22276	-1	36389	2	-1976	-10
36280	-29732	-1	31751	-0	-1850	-9
36320	-31287	-1	22612	0	-1421	-7
36360	-26867	-2	15500	-0	-778	-4
36400	-19500	-2	12957	-0	-28	0
36440	-12804	-3	15184	-1	727	4
36480	-9293	-1	20408	-1	1401	7
36520	-9833	-1	26114	-1	1925	10
36560	-13803	1	29988	-1	2251	11
36600	-19514	0	30504	-1	2343	12
36640	-24734	1	27269	-0	2186	11
36680	-27305	1	21201	1	1784	9
36720	-25900	1	14464	-1	1168	5
36760	-20830	1	9924	-1	396	1

Table 7 (Cont.)

t (days)	Δx_2 Numerical integration	Δx_2 Analytical minus integration	Δy_2 Numerical integration	Δy_2 Analytical minus integration	Δz_2 Numerical integration	Δz_2 Analytical minus integration	t (days)	Δx_2 Numerical integration	Δx_2 Analytical minus integration	Δy_2 Numerical integration	Δy_2 Analytical minus integration	Δz_2 Numerical integration	Δz_2 Analytical minus integration	t (days)	Δx_2 Numerical integration	Δx_2 Analytical minus integration	Δy_2 Numerical integration	Δy_2 Analytical minus integration	Δz_2 Numerical integration	Δz_2 Analytical minus integration
10160	-11667	-0	21253	-1	-1350	0	23480	-393	0	48313	1	2452	6	36800	-14496	1	9925	1	-436	-3
10200	-9079	-1	18531	-1	-663	0	23520	-8118	0	47220	1	2506	6	36840	-10711	1	14643	2	-1204	-6
10240	-2772	2	17725	-1	138	0	23560	-14658	-1	41134	1	2310	6	36880	-12437	-0	21239	0	-1776	-9
10280	4308	1	21169	0	931	0	23600	-17889	0	31677	1	1876	5	36920	-19142	-1	25282	1	-2046	-10
10320	8790	1	28316	-1	1618	0	23640	-17016	-1	21354	0	1234	4	36960	-26550	0	24074	2	-1970	-9
10360	6736	1	36716	1	2128	0	23680	-12874	1	12628	2	440	2	37000	-29863	-1	18911	2	-1576	-7
10400	4122	-0	43492	-1	2416	1	23720	-7567	-1	6890	0	-420	-0	37040	-27350	-1	13847	1	-947	-4
10440	-3533	-0	46420	-0	2460	1	23760	-3323	0	3941	-1	-1236	-2	37080	-20906	-0	12474	-0	-188	-0
10480	-11860	1	44503	0	2258	0	23800	-1190	2	2654	5	-1881	-4	37120	-14110	1	15898	-0	598	4
10520	-18374	0	38145	-1	1826	1	23840	-724	0	2287	0	-2240	-4	37160	-10067	-3	22779	-3	1322	7
10560	-21175	-0	29023	-1	1198	1	23880	-715	-2	2758	1	-2241	-5	37200	-10251	0	30438	-1	1910	10
10600	-19575	2	19658	0	431	0	23920	153	1	4140	-3	-1884	-5	37240	-14287	-0	36075	1	2309	12
10640	-14495	0	12622	-1	-394	1	23960	2665	-0	7000	2	-1240	-3	37280	-20307	1	37709	0	2478	12
10680	-8307	3	9443	2	-1174	1	24000	6291	-3	12383	-0	-421	-1	37320	-25593	1	34805	-0	2395	11
10720	-3805	-0	9944	-2	-1791	-0	24040	9248	0	20726	-1	452	1	37360	-27454	1	28575	-1	2056	9
10760	-2531	1	11990	-2	-2131	-0	24080	9534	1	31052	1	1275	3	37400	-24309	2	21862	-0	1481	6
10800	-3616	1	13280	-2	-2121	-1	24120	6043	-0	41171	1	1964	5	37440	-16812	2	18287	0	724	2
10840	-4376	2	12848	-2	-1753	-1	24160	-852	-1	48501	-0	2458	6	37480	-8354	0	20413	1	-129	-2
10880	-2473	-1	11885	-0	-1094	-0	24200	-9309	-0	51036	-0	2714	6	37520	-3785	-1	27468	1	-953	-6
10920	2191	1	12771	-0	-260	0	24240	-16511	-1	48145	-0	2706	6	37560	-5980	1	34733	3	-1608	-9
10960	7541	-2	17083	-1	617	0	24280	-19535	0	41054	-2	2428	5	37600	-12855	-0	36704	4	-1975	-10
11000	10908	0	24474	-1	1424	1	24320	-16519	2	32838	0	1893	4	37640	-18876	-2	31848	1	-1992	-10
11040	10528	-1	33019	-1	2073	1	24360	-7907	1	27626	1	1145	2	37680	-20075	-0	23549	0	-1678	-8
11080	6171	-0	40230	-1	2504	1	24400	2815	1	28763	1	259	0	37720	-16695	-0	16612	1	-1117	-5
11120	-970	-0	43995	-1	2682	0	24440	10048	-2	36248	-0	-651	-2	37760	-11545	-1	14023	-1	-427	-1
11160	-8760	-0	43207	0	2594	0	24480	9514	-2	45307	1	-1445	-3	37800	-7516	-2	16321	-0	281	3
11200	-14768	-1	38082	1	2244	0	24520	2414	-2	48903	-3	-1980	-4	37840	-6623	-1	22332	-1	923	7
11240	-16989	-2	30178	1	1662	0	24560	-4598	2	43726	-0	-2157	-5	37880	-9947	-1	29941	-1	1439	10
11280	-14592	-2	22063	1	898	0	24600	-5384	2	33387	2	-1954	-4	37920	-17580	0	36640	1	1789	12
11320	-8519	-2	16484	1	30	0	24640	285	-2	24655	2	-1431	-3	37960	-28505	-0	40015	1	1945	12
11360	-1469	-2	15023	-1	-833	0	24680	7951	-0	21801	0	-706	-1	38000	-40577	2	38287	-3	1894	12
11400	3331	-0	16784	1	-1563	-0	24720	13083	1	24978	-2	87	1	38040	-50755	1	30957	-0	1634	10
11440	4496	1	18509	-0	-2030	-1	24760	13455	1	31925	0	833	3	38080	-55771	-1	19422	-0	1181	7
11480	4011	0	17172	-1	-2140	-1	24800	8832	-0	39832	1	1451	5	38120	-53396	-0	7241	1	577	3
11520	5384	-1	13084	-1	-1874	-1	24840	132	1	46207	-1	1888	6	38160	-44158	1	-623	2	-110	-1
11560	9846	-0	9663	-1	-1297	-0	24880	-11003	1	49139	-0	2111	6	38200	-32418	-1	-260	0	-781	-5
11600	15350	2	10122	0	-535	-0	24920	-22362	2	47501	-2	2106	6	38240	-24797	-0	7809	2	-1322	-9
11640	19000	-1	15321	0	267	-0	24960	-31373	3	41282	-1	1871	5	38280	-25381	-1	17743	1	-1632	-11
11680	19013	1	24186	1	988	0	25000	-35589	0	31923	0	1427	4	38320	-31858	-1	22679	1	-1654	-10
11720	14701	0	34839	2	1553	1	25040	-33574	1	22408	0	811	2	38360	-37604	-1	20558	0	-1393	-9
11760	5999	0	45152	2	1917	1	25080	-26064	0	16622	-1	90	0	38400	-37579	-2	14962	1	-905	-5
11800	-6559	-2	52959	3	2061	1	25120	-16690	1	17562	-0	-641	-2	38440	-31529	-3	11072	-1	-271	-1
11840	-21641	-1	56265	1	1983	1	25160	-10895	1	24795	1	-1268	-3	38480	-22752	-1	11767	-1	425	3
11880	-36992	-2	53673	3	1696	1	25200	-12294	-1	33421	1	-1676	-5	38520	-15233	-2	16617	-2	1104	7
11920	-49600	-3	44962	2	1225	0	25240	-19041	0	37173	0	-1784	-5	38560	-11603	-0	23083	-1	1693	10
11960	-56295	-4	31663	2	616	0	25280	-24862	0	33835	-2	-1576	-5	38600	-12475	-1	28291	-0	2127	12
12000	-54900	-4	17327	1	-67	-0	25320	-24551	-1	26936	-1	-1098	-4	38640	-16753	0	30235	-1	2352	13
12040	-45785	-3	6858	-2	-739	-0	25360	-17845	-2	22019	-1	-437	-2	38680	-22387	0	28138	-1	2335	13
12080	-32912	-1	4361	-2	-1299	-0	25400	-8463	1	22226	-1	308	-0	38720	-27150	1	22376	-0	2068	11
12120	-22624	-1	10010	0	-1645	-0	25440	-867	0	26961	-0	1045	2	38760	-29220	1	14297	-0	1562	8
12160	-19379	-1	18809	1	-1703	-0	25480	2132	1	33270	1	1689	4	38800	-27654	2	5973	-0	858	4
12200	-21701	-0	24174	-0	-1457	0	25520	63	-0	37993	0	2166	6	38840	-22793	2	-257	0	33	-1
12240	-23561	1	23750	0	-951	0	25560	-5707	1	39182	-1	2415	6	38880	-16433	-0	-2637	2	-803	-5
12280	-20240	2	20302	0	-275	1	25600	-12943	0	36349	-0	2404	6	38920	-11244	-1	-1068	2	-1513	-8
12320	-11989	4	20119	1	472	1	25640	-19421	1	30083	-1	2127	6	38960	-9199	-0	2509	1	-1966	-10
12360	-2705	1	23744	2	1198	1	25680	-23447	1	21644	-1	1605	4	39000	-10059	-0	5377	2	-2081	-10
12400	3453	2	30142	2	1823	2	25720	-24094	2	12691	-0	884	2	39040	-11658	1	6192	-0	-1850	-9
12440	4348	2	36105	1	2277	2	25760	-21363	1	5051	2	42	1	39080	-11863	-1	5818	1	-1331	-6
12480	271	1	38998	0	2499	2	25800	-16301	3	305	2	-812	-1	39120	-10139	-4	6249	-1	-624	-3
12520	-6935	-0	37739	-1	2457	2	25840	-10827	1	-878	3	-1543	-3	39160	-7577	-1	9025	1	164	2
12560	-15089	0	32539	1	2147	2	25880	-6889	2	683	3	-2018	-5	39200	-5954	1	14395	0	935	6
12600	-22450	0	24232	-1	1596	2	25920	-5166	-1	3043	1	-2144	-5	39240	-6741	-0	21321	-1	1609	9
12640	-27854	-0	13752	-0	855	1	25960	-4563	-0	4655	-1	-1900	-5	39280	-10449	-1	27934	-3	2123	12

Table 7 (Cont.)

t (days)	Δx_2 Numerical integration	Δx_2 Analytical minus integration	Δy_2 Numerical integration	Δy_2 Analytical minus integration	Δz_2 Numerical integration	Δz_2 Analytical minus integration	t (days)	Δx_2 Numerical integration	Δx_2 Analytical minus integration	Δy_2 Numerical integration	Δy_2 Analytical minus integration	Δz_2 Numerical integration	Δz_2 Analytical minus integration	t (days)	Δx_2 Numerical integration	Δx_2 Analytical minus integration	Δy_2 Numerical integration	Δy_2 Analytical minus integration	Δz_2 Numerical integration	Δz_2 Analytical minus integration
12680	-30460	1	1951	-1	0	0	26000	-3367	-1	5655	-0	-1344	-4	39320	-16356	0	32185	-1	2434	13
12720	-29476	2	-10215	-1	-863	-0	26040	-885	0	7488	-0	-583	-2	39360	-22616	1	32556	-1	2512	13
12760	-24278	0	-21258	-1	-1609	-1	26080	2086	0	11507	2	260	0	39400	-26813	-0	28795	-1	2342	11
12800	-15057	-1	-29017	-2	-2107	-1	26120	3969	0	17955	0	1075	3	39440	-26904	-1	22389	-1	1927	9
12840	-3592	-1	-31426	-1	-2255	-1	26160	3412	-1	25821	-0	1773	5	39480	-22316	1	16329	-1	1295	5
12880	7120	-1	-27965	-2	-2016	-1	26200	-1	-1	33251	-3	2294	6	39520	-14749	3	13839	1	501	0
12920	14583	-2	-20202	-1	-1439	-1	26240	-5446	-0	38180	-1	2596	7	39560	-7921	1	16373	1	-358	-4
12960	18163	-1	-10495	0	-637	-1	26280	-10972	1	39047	-1	2657	7	39600	-5620	0	22091	1	-1155	-8
13000	18666	-2	-413	-0	256	-1	26320	-14107	1	35550	1	2473	7	39640	-8771	-1	26640	0	-1753	-11
13040	17029	-2	9586	-2	1114	-0	26360	-12896	-1	29198	2	2052	6	39680	-14318	-0	26545	2	-2045	-11
13080	13597	0	19394	-0	1844	-0	26400	-7040	-1	23084	1	1422	4	39720	-17741	-2	22131	1	-1991	-10
13120	8341	1	28467	3	2381	0	26440	1433	-0	20465	0	634	2	39760	-16706	-2	16809	1	-1623	-7
13160	1501	-1	35603	4	2691	1	26480	8647	2	22622	1	-227	-0	39800	-12149	-1	14085	1	-1022	-3
13200	-5881	-1	39300	2	2756	1	26520	10998	1	27405	1	-1045	-3	39840	-6827	-2	15505	0	-289	1
13240	-11935	-2	38501	2	2576	1	26560	8120	0	30268	-1	-1687	-5	39880	-3464	-1	20494	-0	476	5
13280	-14573	-3	33472	2	2163	1	26600	3855	1	28032	-1	-2036	-6	39920	-3696	1	27171	-0	1185	9
13320	-12509	-2	26254	2	1546	1	26640	3145	1	22052	-2	-2032	-6	39960	-7816	-1	33252	0	1766	11
13360	-6231	-1	20042	0	772	1	26680	7662	1	16948	-1	-1690	-4	40000	-14893	-0	36721	-1	2162	13
13400	1695	-1	17478	0	-83	-0	26720	14938	-1	16516	-1	-1091	-3	0	0	0	0	0	0	0

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