CHAPTER 16

THE USE OF THE STOKES-STRUIK APPROXIMATION FOR WAVES OF FINITE HEIGHT

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ABSTRACT

A formal approximate solution is derived for the profile and velocity components of a wave with permanent form of finite height in moderate water depths. The approximation is carried to the third order, sufficiently far to represent all except the very high "design" waves. The relationship of the formulas to others found in the literature is discussed.

The wavelengths and the coefficients in the third-order series for the wave profile, and the water particle velocities and local accelerations are tabulated for approximately 2000 waves. The depths, heights, and periods for the listed wave conditions vary respectively from 10 to 500 feet, 5 to 40 feet, and 4 to 20 seconds. The range of applicability of the theory is discussed and approximate limits estimated.

As an aid in calculations, tables of the trigonometric and hyperbolic sines and cosines for integral multiples of the argument are included.

DERIVATION OF FORMULAS

We wish to construct potential flows satisfying Bernoulli's theorem on the free surface $\eta(x)$ whose shape is one of the unknowns. The problem is one of some difficulty mathematically because of the non-linear boundary condition. The usual general theorems of existence of solutions for linear problems are not valid and an *ad hoc* verification of existence of a solution must be made to be sure that the formal solution (Stokes, 1847), which can be rather easily obtained, exists. The existence proof was first carried out by Struik (1926) following the method of Levi-Civita (1925) for deep water waves. Struik also obtained formulas for the profile, velocity components, and the necessar auxiliary functions to relate the parameters in these formulas to the usual physically observed wave characteristics.

Unfortunately all these formulas have algebraic errors, as was first pointed out by Hunt (1953) and then independently by Tanaka (1953). However the results of Hunt and Tanaka do not, at first sight, agree. It seemed advisable to make a new and simpler derivation of these result in a slightly different way, in order to clear up these discrepancies. A more recent calculation by De (1955) has checked the results of Hunt and extended them to the fifth approximation.

We introduce the device of a moving coordinate system whose velocity, C, is the celerity of the waves. In this coordinate system, the motion is steady and two-dimensional. It is then convenient to use complex variables (Lamb, 1932) and a complex potential w, whose real and imaginary parts are the velocity potential ϕ and stream function ψ,

$$w(z) = \phi(x,y) + i\psi(x,y), \tag{1}$$

and whose derivative is related to the velocity components v_x and v_y

$$\frac{dw}{dz} = -v_x + iv_y. \tag{2}$$

The mathematical problem may be described briefly. We wish to construct a function w of complex variable z which has the properties that dw/dz has a real period L,

$$\frac{dw}{dz}(z) = \frac{dw}{dz}(z + L), \tag{3a}$$

that there is no flow through the bottom,

$$\mathrm{Im}\, w = 0 \qquad \text{on} \qquad \mathrm{Im}\, z = 0, \tag{3b}$$

and that Bernoulli's equation is satisfied

$$\frac{1}{2}\left|\frac{dw}{dz}\right|^2 + g\ \mathrm{Im}\, z = \text{Const.}, \tag{4a}$$

on the free surface

$$\mathrm{Im}\, w = lC. \tag{4b}$$

We will assume that the solution to the problem has the form

$$w = C\left\{z + \frac{L}{2\pi}\sum_{n=1}^{\infty} a^n A_n \sin nkz\right\}, \tag{5}$$

where $k = 2\pi/L$. We note that equations (3a) and (3b) are satisfied if A_n are real. The success of this assumption will presently justify the form. We know that Bernoulli's theorem must hold on the line given by putting the imaginary part of w equal to a constant lC in equation (5), whose real and imaginary parts are then parametric equations for the profile. The parameter is ϕ, the real part of the potential. We see that we will need to invert equation (5) to obtain z as a function of w, in order conveniently to satisfy Bernoulli's theorem, equation (4a). It is also necessary to obtain dw/dz as a function of w. We will indicate formally how these steps can be carried out, although to justify each step mathematically we would have to investigate the convergence of the assumed solution after we have calculated the values of the coefficients, A_n.

We differentiate equation (5) with respect to z and obtain

$$\frac{dw}{dz} = C\left\{1 + \sum_{n=1}^{\infty} a^n n A_n \cos nkz\right\}. \tag{6}$$

We assume z as a function of w is given by

$$Cz = w + C\frac{L}{2\pi}\sum_{n=1}^{\infty} a^n B_n \sin\frac{nkw}{C}, \tag{7}$$

the justification being that we are able to substitute equation (7) int equation (5) and solve successively for B_n as functions of A_n.

Then we substitute equation (7) in equation (6) and obtain

$$\frac{dw}{dz}(w) = C\left[1 + \sum_{n=0}^{\infty} C_n \sin\frac{nkw}{C}\right], \qquad (8$$

where C_n are functions of a and A_n.

We put Im $w = lC$ in equation (8) and equation (7) and substitute in equation (4a). We find

$$\frac{1}{2}\left|1 + \Sigma\, a^n C_n \cos\frac{nk}{C}(\phi + i lC)\right|^2 + \frac{gL}{2\pi C^2}\,\text{Im}\; z(\phi + i lC) = \text{Const.}\;. \qquad (9$$

We can also put

$$C^2 = \sum_{n=0}^{\infty} D_{2n} a^{2n}. \qquad (:$$

since the celerity may be a function of wave height and depth. Bernoulli's theorem, equation (9), must be valid for all ϕ and a, and we r put the separate coefficients of $a^n \cos m\phi$ equal to zero. When this i done, the resulting equations may be solved successively to obtain

$$A_1 = 1$$

$$A_2 = -\frac{3}{4(\cosh 2kl - 1)}$$

$$A_3 = -\frac{2(\cosh 2kl - 11)}{16(\cosh 2kl - 1)^2}\;.$$

$$D_0 = \frac{\sinh kl}{\cosh kl}\,\frac{gL}{2\pi}$$

$$D_2 = \frac{(2\cosh^2 2kl + 2\cosh 2kl + 5)}{4(\cosh 2kl - 1)}\,\frac{gL}{2\pi}\,\frac{\sinh kl}{\cosh kl}\;.$$

The profile $\eta(x)$ is found by eliminating ϕ from the real and imaginary parts of equation (7), evaluated on $w = \phi + i lC$. Then we obtain the m water level d by integration:

$$d = \frac{1}{L}\int_0^L \eta(x)dx = l + \frac{L}{8\pi} a^2 \sinh 2kl \ , \tag{13}$$

and the wave height H by some algebra,

$$H = \eta\left(\frac{L}{2}\right) - \eta(0)$$

$$= \left[2a \sinh kl + 3a^3 \frac{4 \cosh^3 2kl + 4 \cosh^2 2kl + 1}{8(\cosh 2kl - 1)^2} \sinh kl\right]\frac{L}{2\pi} \, . \tag{14}$$

Finally, the celerity is given by equation (10),

$$C^2 = \frac{\sinh kl}{\cosh kl}\left[1 + \frac{2 \cosh^2 2kl + 2 \cosh 2kl + 5}{4(\cosh 2kl - 1)}\right]\frac{gL}{2\pi}, \tag{15}$$

and the particle velocities from minus the real part and the imaginary part of equation (6),

$$v_x = - \operatorname{Re} \frac{dw}{dz} = - C\left[1 + a \cos kx \cosh ky - \frac{3 \cos 2kx}{2(\cosh 2kl - 1)} \cosh 2ky \right.$$
$$\left. - \frac{3(2 \cosh 2kl - 1)}{16(\cosh 2kl - 1)^2} \cos 3kx \cosh 3ky\right], \tag{16}$$

and

$$v_y = \operatorname{Im} \frac{dw}{dz} = - C\left[a \sin kx \sinh ky - \frac{3 \sin}{2(\cosh 2kl)} 2kx \sinh 2ky \right.$$
$$\left. - \frac{3(2 \cosh 2kl - 1)}{16(\cosh 2kl - 1)^2} \sin 3kx \sinh 3ky\right] . \tag{17}$$

We can transform back into a stationary coordinate system by the substitution

$$\begin{aligned} x &= x' - ct, \\ v_x &= v_x' - c, \end{aligned} \tag{18}$$

and obtain, on dropping the primes,

$$v_x = C\left[a \cos k(x - ct) \cosh ky - \frac{3 \cos 2k(x - ct)}{2(\cosh 2kl - 1)} \cosh 2ky \right.$$
$$\left. - \frac{3(2 \cosh 2kl - 1)}{16(\cosh 2kl - 1)^2} \cos 3k(x - ct) \cosh 3ky\right] , \tag{19}$$

and

$$v_y = - C\left[a \sin k(x - ct) \sinh ky - \frac{3 \sin 2k(x - ct)}{2(\cosh 2kl - 1)} \sinh 2ky \right.$$
$$\left. - \frac{3(2 \cosh 2kl - 1)}{16(\cosh 2kl - 1)^2} \sin 3k(x - ct) \sinh 3ky\right] . \tag{20}$$

The set of three equations (13), (14), and (15) have as unknowns the three auxiliary parameters a, k, and l. We see that, given the wave height, the water depth, and the wave period, they may be solved for these auxiliary parameters. The parameter k has a simple interpr tation as seen from these equations since

$$\frac{2\pi}{k} = L. \qquad (2$$

Also, l and a are related to the depth and height, respectively.

The equations here given check with those of Hunt and Tanaka. T compare with Hunt and De it is necessary to obtain a as a function of μ, which may be done from the equations for the depth and height. It is then found that a is an odd function of μ,

$$a = \sum_{n=0}^{\infty} \mu^{2n+1} M_n(l). \qquad ($$

To compare with Tanaka, it is only necessary to identify his par meter d with our l. His statement that his d is the depth is misleading, since clearly his d is not the mean water level. Finally, it is relevant to notice that the equations pertaining to the Stokes-Struik theory in the Beach Erosion Board Technical Memoranda 1 and 2 are incorrect, as is pointed out by Hunt.

APPLICATION OF THE THEORY

After a theory is explicitly stated, normally two steps remain t be completed before the Engineer or Oceanographer can readily apply t theory to an actual problem. First, some procedure must be given to overcome the computational difficulties involved in the use of the theory, and second, the range of applicability must be indicated so that it is possible to determine when the theory should be used.

COMPUTATIONAL FORMULAS

The Stokes-Struik theory as presented can be put in a somewhat r convenient form for computations as follows. We multiply eq. (13) b eq. (15) and ignore terms containing powers of a greater than the th Then we divide both sides of the resulting equation by $L^2 g$ to obtain

$$\frac{d}{gT^2} = \frac{\tanh kl}{4\pi^2}\left\{kl + \frac{a^2}{4}\left[\sinh 2kl + \frac{kl(\cosh 4kl + 2\cosh 2kl + 6)}{\cosh 2kl - 1}\right]\right\}.$$

Similarly we multiply eq. (14) by eq. (15) and divide by $L^2 g$ ignorin powers of a greater than the third, and obtain

$$\frac{H}{gT^2} = \frac{a\tanh kl}{2\pi^2}\left\{\sinh kl + \frac{a^2}{8}\left[\frac{\sinh kl\ (2\cosh 4kl + 3\cosh 2kl + 10)}{\cosh 2kl - 1} + \frac{\sinh 3kl}{2}\,\frac{(3\cosh 4kl + 4\cosh 2kl + 2)}{(\cosh 2kl - 1)^2}\right]\right\} . \tag{24}$$

Normally at the start of the problem, the depth d, wave height H, and wave period T are known. The symbols π and g are the mathematical constant 3.1415....and the acceleration due to gravity respectively. Hence kl and a are the only two unknown quantities in equations (23) and (24), and the problem becomes one of solving the two nonlinear equations in two unknowns. While this is difficult by hand, it can be solved easily by iteration on an electronic computer. Once kl and a are known, the other properties of the wave follow immediately. An equation for the wavelength in same general form we have been using is obtained by dividing eq. (15) by gL and remembering that $C = L/T$. Hence

$$\frac{L}{gT^2} = \frac{\tanh kl}{2\pi}\left[1 + a^2\frac{(\cosh 4kl + 2\cosh 2kl + 6)}{4(\cosh 2kl - 1)}\right] . \tag{25}$$

The wavelength is thus determined. The wave profile* and the water particle velocities and local accelerations (equations 19 and 20) can be reduced to the convenient form

$$\begin{aligned}
\eta &= d + \eta_1\cos\theta + \eta_2\cos 2\theta + \eta_3\cos 3\theta \\
v_x &= v_1\cos\theta\cosh ky + v_2\cos 2\theta\cosh 2ky + v_3\cosh 3\theta\cosh 3ky \\
v_y &= v_1\sin\theta\sinh ky + v_2\sin 2\theta\sinh 2ky + v_3\sinh 3\theta\sinh 3ky \\
a_x = \frac{\partial v_x}{\partial t} &= a_1\sin\theta\cosh ky + a_2\sin 2\theta\cosh 2ky + a_3\sin 3\theta\cosh 3ky \\
a_y = \frac{\partial v_y}{\partial t} &= -a_1\cos\theta\sinh ky - a_2\cos 2\theta\sinh 2ky - a_3\cos 3\theta\sinh 3ky
\end{aligned} \tag{26}$$

where η_1, η_2, η_3, v_1, v_2, v_3, a_1, a_2, and a_3 are functions solely of L, T, kl and a, and where

$$\theta = 2\pi\left[\frac{x}{L} - \frac{t}{T}\right], \quad k = \frac{2\pi}{L} .$$

Explicitly

$$\begin{aligned}
\eta_1 &= \frac{La}{2\pi}\left[\sinh kl + \frac{a^2}{64}\,\frac{(9\sinh 5kl + 15\sinh 3kl + 6\sinh kl)}{\cosh 2kl - 1}\right. \\
\eta_2 &= \frac{La^2}{16\pi}\,\frac{(\sinh 4kl + 4\sinh 2kl)}{(\cosh 2kl - 1)}
\end{aligned} \tag{27}$$

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*Your attention is drawn to the fact that the wave height computed from $H = \eta(0) - \eta(\pi)$ may occasionally be slightly different from the initial wave height chosen at the start of the problem. This discrepancy is due to the approximations made.

$$\eta_3 = \frac{La^3}{256\pi}\,\frac{(3\sinh 7kl + 15\sinh 5kl + 27\sinh 3kl + 39\sinh kl)}{(\cosh 2kl - 1)^2}$$

$$v_1 = \frac{La}{T}$$

$$v_2 = \frac{3\,La^2}{2T\,(\cosh 2kl - 1)}$$

$$v_3 = -\frac{3\,La^3}{16T}\,\frac{(2\cosh 2kl - 11)}{(\cosh 2kl - 1)^2}$$ (2

$$a_1 = \frac{2\pi v_1}{T}$$

$$a_2 = \frac{4\pi v_2}{T}$$

$$a_3 = \frac{6\pi v_3}{T}\,.$$

As an examination of the equations will show, η/L, v_xT/L, v_yT/L, a_xT^2/L and a_yT^2/L are all dimensionless and depend only on kl and a or in turn only on d/gT^2 and H/gT^2. The same dimensionless form extends to the coefficients.

In all of the preceding formulas, a coordinate system with its origin at the sea floor directly beneath the wave crest when $t = 0$ was used. The x axis is horizontal and positive in the direction of wave propagation while the y axis is positive upwards.

When the quantity d/L becomes very large, the hyperbolic functions of ky in the equations become unmanageably large and exceed most tables of hyperbolic functions. In order to avoid these large numbers, a different coordinate system is used whenever $d/T^2 > 2.56$. This is approximately the same as changing the coordinate system whenever $d/L > 0.5$. The new coordinate system has its origin at the sea surface directly below the wave crest when $t = 0$, and has its y axis positive downward. The x axis remains the same as before. The equations for the velocities and accelerations assume a slightly different form under this transformation. Let y' be the new vertical axis and y be the old one. Then

$$y = d - y'$$ (2

We substitute this into the previous formulas, dropping the prime, and obtain v_x, v_y, a_x, and a_y as:

$$v_x = v_1 e^{-ky}\cos\theta + v_2 e^{-2ky}\cos 2\theta + v_3 e^{-3ky}\cos 3\theta$$

(2

$$v_y = v_1 e^{-ky}\sin\theta + v_2 e^{-2ky}\sin 2\theta + v_3 e^{-3ky}\sin 3\theta$$

$$a_x = a_1 e^{-ky} \sin \theta + a_2 e^{-2ky} \sin 2\theta + a_3 e^{-3ky} \sin 3\theta$$
$$a_y = - a_1 e^{-ky} \cos \theta - a_2 e^{-2ky} \cos 2\theta - a_3 e^{-3ky} \cos 3\theta \qquad (29)$$

TABLES OF COEFFICIENTS

Although all coefficients in the equations for η, v_x, v_y, a_x, and a_y can be stated in a dimensionless form as functions only of d/gT^2 and H/gT^2, a table of the coefficients versus the three variables, wave depth d, wave height H, and wave period T, is more convenient for most computations. Accordingly, the coefficients for approximately 2000 different wave conditions are tabulated in Appendix I. Water depths from 10 feet to 200 feet are listed in 10-foot intervals, and from 200 feet to 500 feet in 20-foot intervals. Wave heights from 5 to 40 feet in increments of 5 feet, and wave periods from 4 seconds to 20 seconds in increments of 2 seconds are given wherever the Stokes-Struik theory is not demonstrably false. In some cases it was convenient to measure the elevation y, from the water surface positive downward instead of from the sea floor positive upward and to use equations (29). The waves for which y should be measured from still water level are indicated in the tables by a minus sign on the wave period (T). The negative sign is used here merely as a convention to indicate the transformation of z.

A heavy preceding dot has been attached to the wave periods on certain waves., This dot indicates that we do not actually believe the Stokes-Struik theory is applicable to those particular waves. However, since a frequently used method for computing the velocities and accelerations in waves for which no theory is available consists of interpolation between the several most nearly applicable theories, the coefficients for the wave are included in the table even though the theory does not apply.

The position of the decimal point is indicated at least twice on each page of the table. The decimal point for any other number in the column can be located by comparison.

CIRCULAR AND HYPERBOLIC SINES AND COSINES FOR INTEGRAL MULTIPLES OF THE ARGUMENT

To facilitate computation of the three-term series, several auxiliary tables were prepared. Table 1 in Appendix II gives sin θ, sin 2θ, sin 3θ, cos θ, cos 2θ, and cos 3θ as a function of θ for each degree of θ between 0° and 360°. Table 2 in Appendix II gives sinh $2\pi y/L$, sinh $4\pi y/L$, sinh $6\pi y/L$, cosh $2\pi y/L$, cosh $4\pi y/L$, and cosh $6\pi y/L$ as a function of y/L in increments of 0.01 from 0 to 1.0. These two tables reduce the labor of looking up the functions for a given computation from six entries in a standard table to only two entries.

RANGE OF APPLICABILITY

Our estimate of the range of applicability of the theory is given Figure 1. For each value of d/T^2 there is a limiting value of H/T^2 suc that waves will break before H/T^2 grows larger. A line connecting thes limiting points is called the breaker index curve. In Figure 1, for th estimation of the breaker index curve, the modified solitary theory was used for $d/T^2 < 0.1$ while the results of an unpublished study made by J. E. Chappelear were used for $d/T^2 > 2.0$. The position of the line in between was estimated and is shown by dashes. This breaker index curve is an obvious upper limit to the use of any wave theory. A somewhat smaller upper boundary can be developed from the wave profile equation. From wave tank studies and from intuition, we are fairly sure that wave have only one maximum per wave cycle, i.e., the wave crest. Even more stringently, we suspect that the waves do not have any jogs or semi-steps in the profile. This is the same as saying that the wave profile should have only one inflection point between the wave crest and trough The boundary line between those waves, as computed by the Stokes-Struik third approximation, that have three inflection points between their crests and troughs and those that have only one is shown in Figure 1 as a solid line. Although this criterion strictly is intuitive, it seems reasonable to the author. The inflection point boundary and the breake index curve cross at about $d/T^2 = 0.7$. Hence the inflection point criterion is unsuitable for larger d/T^2 values, and a different criteri was developed.

The percent of the wave height above still water level for maximum waves where $d/T^2 > 2.0$ was known by a previous unpublished study. Grap of the percent of wave height above still water level were plotted vers H/T^2 holding d/T^2 at a constant value both for the Stokes-Struik third approximation and Chappelear's limiting case. The Stokes-Struik values departed from a smooth curve through the points at about $H/T^2 = 0.45$. The point of departure decreased somewhat with a decrease of d/T^2. Thi departure line is shown as a dash-dot line in Figure 1. Reid and Bretschneider (1953, p. 12) estimate the second approximation of the Stokes Struik theory to be accurate in deep water for approximately $H/T^2 < 0.3$ Hence the boundary line reaching $H/T^2 = 0.45$ for the third approximatic is reasonably consistent with their estimate.

In the preceding work, the basic formulas were derived by Chappele while the section on the application of the theory together with the various tables were prepared by Borgman. Both authors wish to express their appreciation to the Shell Oil Company and the Shell Development Company for permission to publish the paper.

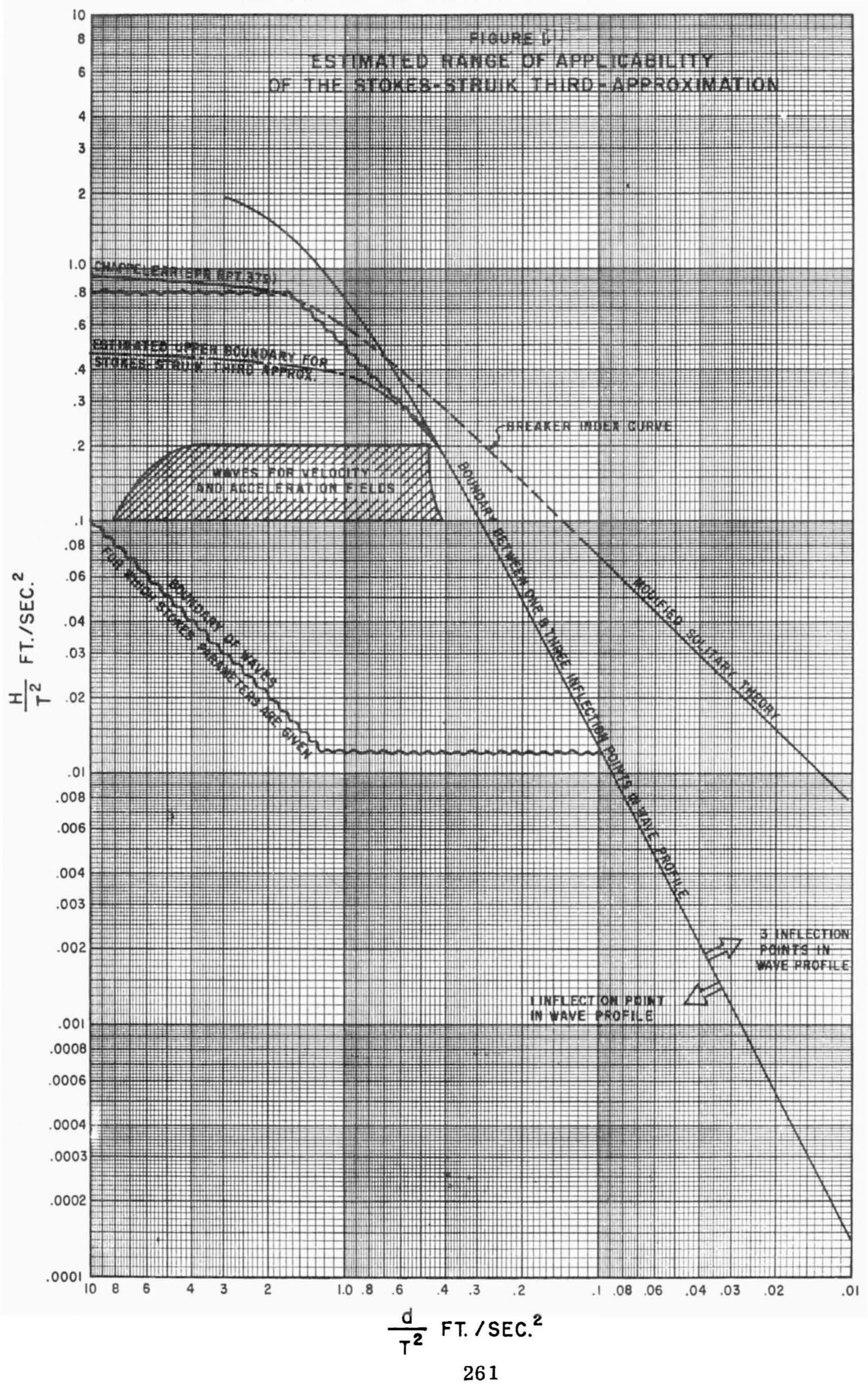
FIGURE 6
ESTIMATED RANGE OF APPLICABILITY
OF THE STOKES-STRUIK THIRD-APPROXIMATION
CHAPPELEAR (BEB RPT 379)
ESTIMATED UPPER BOUNDARY FOR
STOKES-STRUIK THIRD APPROX.
BREAKER INDEX CURVE
WAVES FOR VELOCITY
AND ACCELERATION FIELDS
BOUNDARY BETWEEN ONE & THREE INFLECTION POINTS IN WAVE PROFILE
MODIFIED SOLITARY THEORY
BOUNDARY OF WAVES
FOR WHICH STOKES PARAMETERS ARE GIVEN
3 INFLECTION
POINTS IN
WAVE PROFILE
1 INFLECTION POINT
IN WAVE PROFILE
$\frac{H}{T^2}$ FT./SEC.^{2}
10
8
6
4
3
2
1.0
.8
.6
.4
.3
.2
.1
.08
.06
.04
.03
.02
.01
.008
.006
.004
.003
.002
.001
.0008
.0006
.0004
.0003
.0002
.0001
10
8
6
4
3
2
1.0
.8
.6
.4
.3
.2
.1
.08
.06
.04
.03
.02
.01
$\frac{d}{T^2}$ FT. / SEC.^{2}

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LIST OF SYMBOLS

a = a mathematical parameter in the Stokes-Struik third approximation. The physical meaning is given by the formulae.

A_n = expansion coefficients to be calculated.

a_x, a_y = horizontal and vertical components of the local accelerations of water particles, i.e., $a_x = \partial v_x/\partial t$, $a_y = \partial v_y/\partial t$; (ft/sec^2).

a_1, a_2, a_3 = Stokes-Struik third approximation coefficients for the local accelerations.

B_n = expansion coefficients to be calculated.

C = wave celerity, or speed of advance of the waveform (ft/sec).

C_n = expansion coefficients to be calculated.

d = still water depth, or depth the water would assume if th waves were calmed down and the water was still (ft).

D_{2n} = expansion coefficients to be calculated.

g = acceleration due to gravity (nominally taken as 32.16 ft/sec^2).

H = wave height, or vertical distance between a crest and th preceding trough (ft).

k = $2\pi/L$ (ft^{-1}).

l = = a mathematical parameter in the Stokes-Struik third approximation. The physical meaning is given by the formulae.

L = wavelength, or horizontal distance between two succeeding troughs or crests in the direction of wave propagation (ft).

t = time measured from the instant when the wave crest was above the origin of the coordinate system (seconds).

T = wave period, or length of time for two succeeding crests to pass a fixed point (seconds).

v_x, v_y = horizontal and vertical components of the water particle velocities (ft/sec).

v_1, v_2, v_3 = Stokes-Struik third approximation coefficients for the water particle velocities (ft/sec).

$w(z)$ = complex potential, $\phi + i\psi$

for T marked plus - x, y = horizontal and vertical coordinate axis, respectively. The origin is at the sea floor directly below the wave crest when $t = 0$. x is positive in the direction of wave propagation and y is positive upwards.

for T marked minus - x, y = horizontal and vertical coordinate axis, respectively. The origin is at still water level directly beneath the wave crest when $t = 0$. x is positive in the direction of wave travel and y is positive downwards.

$z =$ = complex variable, $x + iy$

$\eta(x)$ = vertical elevation of the wave profile above the sea floor, (ft). η is a function of x or of θ depending on what horizontal measure of distance is being used.

η_1, η_2, η_3 = Stokes-Struik third approximation coefficients in the equation for the wave profile (ft).

θ = angular phase position or distance from crest measured so as to make
$\theta = 0$ at the crest and $\theta = 180°$ at the preceding trough. In general,
$\theta = 2\pi(x/L - t/T)$, but usually t is set to zero and the simpler formula
$\theta = 2\ x/L$ is used (dimensionless)

$\phi(x, y)$ = velocity potential

$\psi(x, y)$ = stream function

APPENDIX I

STOKES-STRUIK THIRD-APPROXIMATION COEFFICIENTS FOR AN ASSEMBLAGE OF WAVE CONDITIONS

Column Headings:

d = water depth (ft)
H = wave height (ft)
T = wave period (sec)
L = wavelength (ft)
η_1, η_2, η_3 = profile coefficients (ft)
v_1, v_2, v_3 = velocity coefficients (ft/sec)
a_1, a_2, a_3 = local acceleration coefficients (ft/sec^2)

(The reader is referred to the list of symbols for more detailed definitions, and to the text for the mathematical series in which the coefficients are to be used.)

The decimal point position is indicated in the first line of each depth group and on the first line of each page. The decimal positions of the other numbers in a given column are the same as those where the position is indicated.

APPENDIX I

STOKES-STRUIK THIRD-APPROXIMATION COEFFICIENTS FOR AN ASSEMBLAGE OF WAVE CONDITIONS

d	H	T	L	η_1	η_2	η_3	V_1	~~V_2~~ $\frac{1}{2}V_2$	V_3	O_1	~~O_2~~ $\frac{1}{2}Q_2$	O_3
18	5	•4	668	2346	.6583	.2075	3100	.1953	.0188	4870	.6136	.0886
20	3	4	787	2437	.3030	.0307	1582	.0089	.0002-	2485	.0278	.0010-
20	3	6	1377	2431	4169	754	2368	838	49	2480	1796	154
20	3	8	1947	2368	6137	1441	2594	2205	443	2037	3464	1848
28	10	•4	838	4823	9915	2939	3237	460	16-	5084	1445	75-
20	10	•6	1440	4632	14044	4605	4494	3452	465	4706	7187	1460
30	5	4	830	2472	.2336	.0330	.792	0005	.0000	1244	.0016	.0000
50	5	6	1565	2475	2356	259	1686	180		1765	377	
58	5	8	2270	2459	3267	420	2049	648	58	1609	1019	90
30	5	10	2932	2428	4531	749	2195	1323	190	1379	1662	358
30	5	12	3625	2383	3990	1273	2243	2128	526	1175	2228	827
30	5	14	4294	2517	7497	2006	2233	2987	1090	1002	2681	1467
30	10	•4	880	4879	7630	1893	1706	31	1-	2680	97	5-
30	10	6	1607	4851	8506	1774	3322	756	5	3479	1584	15
30	10	8	2326	4751	11674	2869	3933	2529	317	3089	3972	746
30	10	10	3036	4573	13461	4818	4092	4841	1392	2571	6084	2624
30	15	•6	1662	7144	17118	5058	4912	1818	41	5144	3807	127
30	15	8	2401	6878	23190	8135	5646	5372	1126	4434	8752	2653
40	5	4	842	2474	.2172	.0293	.386	.0000	.0000	.606	.0000	.0000
40	5	6	1683	2485	1665	142	1224	45		1281	95	2-
40	5	8	2318	2483	2078	181	1630	238	4	1296	373	9
40	5	10	3314	2472	2808	296	1847	359	33	1161	703	66
40	5	12	4091	2450	3720	491	1941	974	119	1016	1020	187
40	5	14	4858	2424	4771	787	1983	1462	281	891	1312	379
40	5	16	5620	2383	3891	1192	1994	1994	342	783	1566	638
40	5	18	6380	2339	7056	1721	1982	2553	915	692	1782	958
40	5	20	7137	2265	8076	2307	1938	3064	1370	609	1925	1291
40	10	•4	893	4892	7039	1661	871	2		1369	6	
40	10	6	1721	4913	6161	1003	2451	196	4-	2566	410	12-
40	10	8	2556	4881	7787	1320	3241	954	36	2546	1499	85
40	10	10	3367	4806	10346	2111	3575	2167	279	2246	2724	526
40	10	12	4168	4688	13277	3357	3688	3637	883	1931	3809	1387
40	10	14	4964	4538	16300	5060	3685	5213	1942	1654	4679	2614
40	15	•6	1768	7280	12616	2922	3685	485	11-	3839	1015	35-
40	15	8	2609	7172	16126	3952	4754	2166	138	3734	5405	326
40	13	10	3441	6974	21039	6200	3132	4707	938	3237	5915	1768
40	20	•6	1820	9618	20461	3990	4935	955	22-	5168	2001	70-
40	20	•8	2673	9383	26339	8298	6200	3907	376	4870	6136	886
50	5	4-	845	2476	.2133	.0283	7630	.0023	.0005-	11985	.0079	0021-
30	5	6	1739	2490	1354	101	894	12		937	26	
50	5	8	2708	2490	1494	100	1353	99		1063	135	
58	5	10	3614	2488	1937	147	1582	270	8	994	339	15
30	5	12	4491	2480	2539	254	1702	507	34	891	531	53
50	5	14	5330	2456	3229	363	1760	789	88	790	709	119
50	5	16	6201	2430	4071	362	1803	1130	186	708	887	219
50	5	18	7047	2430	4970	828	1821	1501	356	636	1048	352
50	5	20	7888	2388	5842	1149	1812	1872	537	569	1176	306
30	10	•4-	897	4896	6886	1604	14511	140	45-	22794	440	211-
50	10	6	1793	4937	5045	717	1807	34	1-	1892	113	4-
30	10	8	2738	4930	5712	731	2684	401	2	2108	629	5
50	10	10	3651	4897	7369	1096	3108	1067	65	1953	1341	122
50	10	12	4542	4839	9503	1704	3309	1960	263	1733	2053	413
50	10	14	5422	4735	11895	2396	3391	2999	663	1522	2692	895
50	10	16	6298	4643	14377	3778	3399	4111	1314	1335	3229	1548
50	10	18	7170	4308	16786	5220	3335	5223	2219	1171	3647	2324
50	13	•6	1838	7337	10393	2099	2749	137	4-	2878	288	13-
50	15	8	2781	7301	12092	2312	3984	924	11	3129	1451	27
30	15	10	3705	7201	13310	3367	4555	2374	223	2862	2983	425
50	15	12	4616	7044	19650	5122	4790	4241	862	2308	4441	1354
30	15	14	5522	6830	23961	7529	4836	6291	2070	2170	5647	2787
30	20	•6	1889	9712	16901	4305	3725	279	10-	3900	584	32-
30	20	8	2833	9608	20102	4957	5251	1691	38	4124	2656	89
30	20	10	3771	9403	25635	7209	5924	4180	536	3722	5252	1049
50	25	•6	1942	12087	24293	7541	4733	497	21-	4959	1041	65-
30	25	•8	2890	11873	29392	8771	6495	2732	99	5101	4291	254
50	25	•10	3845	11530	37246	12733	7227	6487	1137	4541	8152	2143
60	5	4-	846	2475	.2125	.0283	7626	0006	.0001-	11979	.0018	.0005-
60	5	6	1804	2494	1201	83	652	3		683	7	
60	5	8	2853	2494	1170	66	1123	44		882	69	
60	5	10	3865	2494	1442	86	1372	142	2	862	178	4
60	3	12	4837	2489	1850	128	1508	286	11	789	300	17
60	5	14	5785	2488	2368	198	1591	471	33	714	423	44
60	5	16	6720	2477	2954	297	1637	687	73	643	539	86
60	5	18	7646	2458	3592	432	1660	926	137	580	646	143
60	10	•4-	898	4897	.6849	.1590	14510	0035	.0011-	22792	.0109	.0053-
60	10	6	1837	4947	4479	590	1327	15		1389	32	
60	10	8	2881	4951	4513	496	2237	180	1-	1757	282	3-
60	10	10	3892	4937	5569	650	2715	565	16	1706	710	29
60	10	12	4873	4907	7099	967	2966	1126	87	1553	1180	137
60	10	14	5836	4860	8924	1455	3097	1817	252	1390	1631	340
60	10	16	6789	4800	10950	2142	3160	2604	547	1241	2045	644
60	10	18	7737	4709	13006	3011	3166	3428	987	1105	2393	1034
60	10	20	8682	4613	15155	4111	3149	4296	1602	989	2699	1510
60	15	6	1882	7364	9235	1726	2038	40	1-	2134	83	3-
60	15	8	2918	7363	9671	1552	3542	418	3-	2625	657	8-
60	15	10	3935	7312	11955	2051	4018	1273	56	2525	1600	106
60	15	12	4929	7223	15095	3016	4352	2486	294	2279	2603	462
60	15	14	5911	7092	18659	4442	4499	3927	819	2019	3525	1103
60	13	16	6887	6921	22358	6322	4531	5482	1701	1779	4305	2004
60	20	•6	1932	9759	15007	3331	2790	83	3-	2922	173	9-
60	20	8	2964	9724	16242	3369	4437	774	6-	3484	1215	14-
60	20	10	3988	9609	20104	4488	5272	2268	143	3312	2850	269
60	20	12	4998	9428	25139	6532	5657	4326	699	2962	4531	1098
60	20	14	6002	9178	30579	9422	5789	6683	1864	2598	6000	2510
60	23	•8	3013	12051	23950	6017	5525	1264	6-	4339	1986	14-
60	25	10	4048	11848	29680	8083	6487	3563	302	4076	4478	569
60	23	12	3077	11543	36741	11642	6893	6630	1373	3609	6943	2157
60	30	•6	2039	14562	28658	9095	4416	257	12-	4625	538	38-
60	30	•8	3070	14331	32569	9321	6607	1906		5189	2994	2
60	30	•10	4115	14038	40402	12898	7666	5172	565	4817	6499	1065
70	5	4-	846	2475	.2123	.0283	7623	.0001	.0000	11978	.0004	.0001-
70	5	6	1829	2493	1120	74	473			495	2	
70	5	8	2968	2495	975	48	937	20		736	32	
70	3	10	4075	2496	1135	56	1202	79		755	99	
70	5	12	5139	2492	1421	78	1350	172	4	707	180	6
70	5	14	6173	2495	1800	117	1441	295	13	647	263	18
70	5	16	7188	2485	2231	172	1494	441	32	587	346	37
70	5	18	8192	2479	2730	251	1530	609	63	534	425	66
70	5	20	9187	2466	3268	354	1550	794	109	487	499	102
70	10	•4-	898	4897	6839	1586	14509	9	3-	22791	27	13-
70	10	6	1862	4955	4183	527	969	4		1014	9	
70	10	8	2991	4965	3783	366	1873	84		1471	132	2-
70	10	10	4098	4960	4430	429	2390	316	3	1501	397	6
70	10	12	5167	4942	5533	603	2673	683	31	1399	715	49
70	10	14	6210	4922	6940	889	2838	1139	105	1274	1040	141
70	10	16	7239	4875	8503	1290	2923	1708	244	1148	1342	288
70	10	18	8259	4826	10241	1837	2969	2326	471	1036	1624	494
70	10	20	9274	4737	12034	2325	2979	2977	797	936	1871	751
70	13	6	1907	7377	8618	1542	1501	11		1572	24	
70	15	8	3026	7396	8147	1153	2809	196	3-	2206	309	7-
70	13	10	4133	7376	9616	1373	3555	717	13	2234	901	24
70	15	12	5210	7321	11957	1922	3952	1524	107	2069	1396	168
70	13	14	6268	7239	14800	2785	4161	2539	347	1867	2279	467
70	15	16	7315	7134	17956	3991	4261	3700	791	1673	2906	932
70	15	18	8356	6987	21160	5512	4279	4923	1472	1494	3437	1542
70	15	20	9394	6805	24270	7317	4240	6148	2397	1332	3863	2259
70	20	•6	1959	9783	13978	3144	2076	25		2174	51	2-
70	20	8	3068	9789	13764	2522	3747	367	7-	2943	576	17-
70	20	10	4178	9731	16354	3048	4691	1286	34	2948	1616	63
70	20	12	5266	9618	20253	4256	5180	2683	259	2712	2810	406
70	20	14	6340	9455	24810	6091	5414	4398	809	2430	3947	1089
70	20	16	7408	9231	29553	8310	5487	6271	1779	2155	4926	2096
70	25	•6	2013	12188	20001	5310	2692	47	2-	2819	98	3-
70	25	•8	3116	12149	20380	4323	4688	604	13-	3682	949	31-
70	25	10	4230	12035	24372	5533	5802	2035	74	3646	2557	140
70	25	12	5330	11840	30037	7728	6358	4155	517	3329	4351	813
70	25	14	6423	11566	36400	10915	6593	6688	1555	2959	6003	2093
70	30	•6	2067	14607	26542	8015	3349	81	3-	3507	170	11-
70	30	•8	3167	14492	27827	7186	5635	920	20-	4426	1445	48-
70	30	10	4287	14300	33458	8947	6892	2974	146	4330	3737	275
70	30	12	5402	13996	41013	12404	7490	5937	918	3922	6217	1442
70	35	•8	3221	16825	35979	10522	6589	1326	28-	5175	2083	67-
70	35	•10	4348	16531	43436	13263	7961	4114	261	5002	5170	492
70	35	•12	5478	16100	52979	18330	8583	8032	1500	4494	8411	2356
80	5	4-	846	2475	.2123	0283	7626	.0000	0000	11979	.0000	.0000
80	5	6	1842	2494	1080	70	341			357		
80	3	8	3054	2498	832	38	784	10		616	15	
80	3	10	4253	2496	934	39	1060	46		666	57	
80	5	12	5404	2497	1141	52	1219	108	1	638	113	2
80	5	14	6520	2493	1417	75	1314	193	6	590	173	8
80	5	16	7614	2497	1762	109	1379	298	15	542	234	18

APPENDIX I

STOKES-STRUIK THIRD-APPROXIMATION COEFFICIENTS FOR AN ASSEMBLAGE OF WAVE CONDITIONS (CONTINUED)

d	H	T	L	η_1	η_2	η_3	V_1	~~V_2~~	V_5	a_1	~~a_2~~	a_3
80	5	20	9759	2484	.2571	.0220	1445	.0534	.0036	.434	.0348	.0052
80	10	•4-	898	4897	6837	1586	14509	2		22791	7	3-
80	10	6	1876	4956	4827	496	703	1		757	2	
80	10	8	3076	4969	3307	292	1369	40		1233	63	1-
80	10	10	4273	4969	3661	306	2112	183		1327	230	
80	10	12	5427	4959	4465	404	2420	431	12	1267	452	18
80	10	14	6350	4946	5537	377	2604	763	46	1169	687	62
80	10	16	7632	4919	6786	828	2711	1165	117	1065	915	138
80	10	18	8745	4894	8213	1180	2780	1626	239	971	1135	230
80	10	20	9825	4853	9667	1616	2805	2113	417	881	1328	393
80	13	•4-	936	7534	12373	3836	20836	8	4-	32760	27	17-
80	15	6	1922	7384	8287	1447	1100	3		1132	7	
80	13	8	3109	7416	7155	925	2363	94	2-	1836	148	4-
80	13	10	4303	7409	8006	988	3134	418	1	1982	523	2
80	15	12	5462	7376	9750	1308	3397	969	40	1883	1014	63
80	15	14	6595	7532	12028	1855	3832	1700	156	1729	1526	209
80	15	16	7712	7233	14388	2626	3987	2557	386	1566	2008	455
80	15	18	8820	7134	17357	3649	4031	3505	765	1414	2447	801
80	15	20	9922	7029	20196	4921	4062	4501	1312	1276	2828	1237
80	20	•6	1974	9795	13417	2942	1535	7		1607	13	
80	20	8	3150	9827	12121	2030	3164	177	4-	2485	278	10-
80	20	10	4342	9801	13719	2213	4178	753	4	2625	946	8
80	20	12	5508	9725	16676	2934	4736	1713	98	2480	1796	154
80	20	14	6654	9621	20410	4121	5041	2968	367	2262	2664	494
80	20	16	7788	9471	24530	5766	5188	4410	889	2037	3464	1048
80	20	18	8915	9280	28802	7868	5233	5957	1720	1827	4159	1801
80	25	•6	2029	12206	19152	4950	2010	14		2104	30	1-
80	25	8	3196	12212	17995	3652	3974	295	8-	3121	463	19-
80	25	10	4589	12153	20594	4073	3189	1198	12	3260	1505	23
80	25	12	5563	12025	25021	5410	5847	2678	199	3061	2805	313
80	25	14	6723	11839	30360	7521	6181	4559	716	2774	4092	963
80	25	16	7875	11582	36101	10377	6319	6677	1688	2481	5244	1989
80	30	•6	2084	14631	25346	7437	2523	26		2642	53	3-
80	30	•8	3246	14578	24613	5810	4795	453	14-	3766	711	33-
80	30	10	4440	14466	28433	6606	6185	1760	28	3886	2211	52
80	50	12	5624	14265	54492	8789	6922	3854	559	3624	4036	564
80	30	14	6799	13971	41554	12121	7271	6459	1237	3263	5797	1666
80	35	•8	3297	16936	31861	8510	5628	659	22-	4421	1035	51-
80	35	10	4495	16752	57107	9850	7171	2448	55	4505	3076	104
80	35	12	5690	16455	44919	13114	7967	5246	596	4172	5494	936
80	35	14	6882	16046	55769	17965	8319	8659	1971	3754	7773	2654
80	40	•8	3551	19293	39661	11757	6473	920	32-	5084	1445	75-
80	40	•10	4553	19016	46506	13824	8146	3271	101	5118	4110	191
80	40	•12	5760	18609	56177	18421	8988	6863	930	4706	7187	1460
90	5	4-	846	2475	2122	.0283	7625	.0000	0000	11978	.0000	.0000
90	3	6	1850	2494	1058	67	245			257		
90	5	8	3119	2498	770	32	656	5		515	7	
90	5	10	4403	2497	796	30	940	27		590	34	
90	5	12	5639	2503	948	37	1109	71		581	74	
90	5	14	6854	2498	1159	51	1210	132	3	543	118	4
90	5	16	8002	2494	1419	72	1274	207	7	500	163	9
90	5	18	9152	2495	1729	103	1321	298	16	461	208	17
90	5	20	10288	2488	2066	144	1349	398	30	424	250	28
90	10	•4-	898	4897	6837	1386	14510			22793	2	
90	10	6	1884	4957	3946	480	509			533		
90	10	8	3140	4976	2997	248	1317	19		1034	30	
90	10	10	4421	4977	3130	232	1875	109		1178	137	
90	10	12	5658	4968	3707	288	2201	281	4	1153	294	7
90	10	14	6858	4961	4543	597	2401	522	21	1077	469	29
90	10	16	8033	4945	5545	361	2524	819	59	991	643	70
90	10	18	9192	4923	6689	788	2602	1164	127	908	812	132
90	10	20	10340	4893	7938	1087	2648	1546	231	832	972	218
90	15	•4-	956	7335	12575	3835	20857	2		32762	7	5-
90	15	6	1930	7388	8110	1398	802			848	2	
90	15	8	3172	7428	6486	785	1986	46		1560	72	2-
90	15	10	4448	7429	6867	734	2805	249	1-	1762	313	2-
90	15	12	5688	7416	8171	944	3286	635	15	1720	665	23
90	15	14	6895	7375	9940	1290	3564	1165	72	1599	1046	97
90	15	16	8081	7329	12069	1808	3733	1815	198	1466	1425	253
90	15	18	9254	7263	14421	2507	3828	2551	415	1336	1781	435
90	15	20	10419	7175	16908	3401	3872	3348	744	1216	2104	701
90	20	•4-	1012	9835	18829	6829	26894	7	4-	42244	23	18-
90	20	•6	1983	9802	13111	2835	1130	2		1183	4	
90	20	8	3212	9854	11013	1728	2668	87	2-	2096	136	5-
90	20	10	4484	9845	11829	1702	3727	452	2-	2342	568	4-
90	20	12	5727	9803	14875	2157	4341	1129	37	2273	1183	58
90	20	14	6944	9729	17087	2916	4693	2055	173	2106	1844	252
90	20	16	8143	9623	20564	4040	4889	3161	461	1920	2482	543
90	20	18	9333	9488	24327	5530	4985	4393	950	1740	3067	995

d	H	T	L	η_1	η_2	η_8	V_1	~~V_2~~	V_3	a_1	~~a_2~~	a_3
90	20	20	10317	9313	28168	7370	5009	.5689	.1668	1574	.3573	.1572
90	25	•6	2038	12216	18682	4756	1493	4		1564	9	
90	23	8	3258	12231	16364	3112	3563	143	4-	2641	228	18-
90	25	10	4326	12226	17837	3148	4641	721	3-	2916	906	6-
90	23	12	3774	12143	21246	3970	5575	1769	76	2815	1833	119
90	23	14	7001	12003	25646	3384	5779	3174	540	2394	2849	457
90	25	16	8217	11833	30685	7408	3994	4837	889	2554	3799	1047
90	23	18	9424	11591	35832	9960	6068	6622	1784	2118	4623	1868
90	30	•6	2094	14645	24674	7123	1892	8		1981	17	
90	30	•8	3307	14634	22398	4952	4072	223	7-	3198	354	17-
90	50	10	4573	14376	24736	5154	3549	1064	3-	3486	1337	6-
90	30	12	3828	14442	29491	6505	6387	2538	159	5344	2679	219
90	30	14	7067	14235	35478	8799	6835	4333	595	3068	4869	801
90	30	16	8299	13957	42037	11957	7045	6810	1312	2766	5549	1782
90	30	18	9526	13609	48682	15902	7095	9221	2977	2477	6438	3118
90	35	•6	2150	17098	31005	9903	2524	14		2434	29	1-
90	33	•8	3358	17010	29003	7251	4797	531	12-	5768	520	28-
90	35	10	4624	16896	32387	7682	6449	1486		4852	1867	2-
90	35	12	5886	16698	38653	9783	7377	3499	235	3862	3664	369
90	35	14	7139	16392	46249	13162	7830	6110	956	3525	5484	1280
90	35	16	8387	16008	54454	17745	8050	9075	2371	3161	7126	2793
90	40	•8	3410	19384	36103	10009	5536	466	18-	4348	752	44-
90	48	•10	4678	19207	40744	10827	7549	1996	6	4618	2309	11
90	48	12	5948	18920	48614	13834	8548	4599	373	4571	4816	585
90	40	14	7215	18514	57949	18558	8840	7923	1451	5967	7112	1954
100	5	4-	846	2476	.2123	.0283	7627	.0000	.0000	11980	.0000	.0000
100	5	6-	1854	2495	1048	66	5208	13	1-	5454	32	4-
100	5	8	3167	2498	714	29	549	2		431	4	
100	3	10	4530	2498	697	24	835	16		323	21	
100	5	12	5847	2499	802	28	1010	47		529	49	
100	5	14	7119	2504	973	37	1120	92	1	503	85	2
100	5	16	8360	2506	1186	51	1192	150	4	468	118	5
100	5	18	9578	2499	1427	71	1237	218	9	452	152	9
100	5	20	10781	2480	1683	97	1261	292	17	396	183	16
100	10	•4-	898	4897	6836	1585	14509			22791		
100	10	6-	1888	4958	5903	472	10230	66	11-	10713	138	33-
100	10	8	3187	4978	2783	219	1103	9		866	15	
100	10	10	4546	4982	2747	185	1669	66		1049	83	
100	10	12	5863	4978	3163	216	2013	188	1	1054	197	2
100	10	14	7139	4981	3829	289	2228	368	10	1000	330	14
100	10	16	8384	4959	4624	396	2357	591	31	925	464	37
100	10	18	9610	4951	5577	553	2448	858	71	854	599	74
100	10	20	10823	4921	6598	755	2500	1153	133	785	725	125
100	13	•4-	956	7534	12573	3834	20836			32760	2	1-
100	15	6-	1935	7590	8016	1372	15009	167	38-	15717	349	120-
100	15	8	3219	7437	6033	697	1668	22		1310	35	
100	15	10	4572	7443	6044	604	2501	152	1-	1571	191	3-
100	15	12	5890	7432	6981	710	3006	425	5	1574	445	8
100	15	14	7170	7403	8590	938	3508	820	34	1485	736	46
100	15	16	8424	7374	10143	1292	3499	1316	105	1374	1034	123
100	15	18	9661	7328	12125	1779	3616	1892	233	1262	1321	244
100	15	20	10887	7270	14287	2417	3685	2532	436	1138	1591	411
100	20	•4-	1012	9835	18827	6828	26893	2	1-	42244	7	5-
108	20	•6-	1988	9806	12946	2778	19564	337	98-	20487	705	307-
100	20	8	3259	9870	10249	1534	2247	43		1765	67	2-
100	20	10	4605	9874	10442	1370	3329	276	3-	2091	346	6-
100	20	12	5924	9848	12102	1621	3983	759	13	2086	794	20
100	20	14	7211	9798	14540	2144	4374	1453	83	1963	1304	112
100	20	16	8476	9727	17473	2931	4607	2311	247	1809	1815	291
100	20	18	9727	9625	20713	3992	4738	3290	541	1654	2297	567
100	20	20	10970	9513	24219	5367	4807	4366	998	1510	2743	941
100	25	•6-	2043	12222	18425	4652	23938	598	206-	25068	1233	446-
100	25	8	3304	12275	15228	2761	2840	72	2-	2231	113	5-
100	25	10	4645	12276	15796	2543	4154	442	6-	2610	555	11-
100	23	12	5966	12225	18370	3033	4946	1193	27	2590	1249	42
100	25	14	7261	12133	22014	4005	5408	2259	165	2427	2028	223
100	25	16	8538	12001	26287	5433	5671	3557	480	2227	2794	566
100	25	18	9805	11828	30925	7324	5805	5014	1032	2026	3501	1081
100	25	20	11066	11615	35706	9673	5850	6562	1861	1838	4123	1754
100	30	•6-	2100	14653	24299	6950	28169	975	382-	29499	2043	1201-
100	30	•8	3353	14672	20852	4395	3451	113	4-	2711	177	8-
100	50	10	4689	14652	21973	4164	4978	654	9-	3128	822	17-
100	30	12	6014	14563	25627	5002	5892	1730	51	3085	1812	80
100	30	14	7318	14415	30632	6595	6415	3237	291	2879	2906	392
100	30	16	8609	14212	36383	8890	6698	5048	827	2630	3965	974
100	30	18	9892	13944	42437	11850	6821	7037	1741	2381	4913	1823
100	35	•6-	2136	17107	30484	9639	32288	1494	651-	33812	3130	2044-
100	35	•8	3405	17061	27000	6433	4079	167	6-	3204	262	14-
100	35	10	4737	17002	28852	6251	5800	917	13-	3644	1153	24-

APPENDIX I

STOKES-STRUIK THIRD-APPROXIMATION COEFFICIENTS FOR AN ASSEMBLAGE OF WAVE CONDITIONS (CONTINUEO)

d	H	T	L	η_1	η_2	η_3	V_1	~~V_2~~	V_3	a_1	~~a_2~~	a_3
100	35	12	6066	16864	33744	.7566	6823	.2375	.0088	3572	.2487	.0138
100	35	14	7381	16647	40225	9959	7394	4387	473	3319	3938	637
100	35	16	8686	16350	47479	13323	7684	6763	1307	3017	5312	1540
100	35	18	9987	15971	54935	17573	7786	9325	2696	2718	6510	2824
100	40	•8	3457	19445	53587	8865	4723	238	9-	5709	373	22-
100	40	•10	4788	19336	56356	8823	6622	1236	16-	4161	1553	31-
100	40	12	6122	19135	42618	10751	7739	3132	145	4052	3279	224
100	40	14	7448	18835	50660	14128	8349	5709	723	3747	5124	974
100	40	16	8769	18435	59471	18783	8637	8706	1947	3392	6838	2294
110	5	4-	846	2475	.2123	.0283	7626	.0000	0000	11978	.0000	.0000
110	5	6-	1856	2494	1041	66	5203	8		5449	16	2-
110	5	8	3202	2497	676	26	458	1		360	2	
110	5	10	4637	2498	624	20	744	10		468	13	
110	5	12	6032	2498	695	21	924	32		484	33	
110	5	14	7379	2503	829	28	1039	66		466	59	
110	5	16	8690	2495	994	37	1109	109	2	436	86	2
110	5	18	9975	2509	1209	52	1167	164	5	407	115	5
110	5	20	11243	2488	1419	70	1193	222	10	375	139	9
110	10	•4-	898	4897	6836	1585	14509			22791		
110	10	6-	1890	4958	3880	467	10226	34	5-	10708	71	17-
110	10	8	5222	4981	2638	201	923	5		725	7	
110	10	10	4652	4980	2459	154	1486	41		934	51	
110	10	12	6046	4988	2757	169	1847	128		967	134	
110	10	14	7395	4985	3275	217	2069	263	5	929	236	7
110	10	16	8710	4981	3945	293	2214	438	17	869	344	20
110	10	18	10002	4972	4730	402	2310	646	41	806	451	43
110	10	20	11277	4949	5591	545	2370	881	80	745	554	75
110	15	•4-	956	7334	12573	3834	20856			32760		
110	15	6-	1937	7391	7967	1558	15004	88	20-	15712	183	63-
110	15	8	3254	7442	5718	638	1398	11		1098	17	
110	15	10	4676	7451	5429	503	2231	94	1-	1402	118	2-
110	15	12	6070	7446	6090	556	2758	290	1	1444	503	2
110	15	14	7422	7434	7232	711	3084	590	17	1384	530	22
110	15	16	8745	7408	8670	957	3289	975	57	1292	766	68
110	15	18	10045	7375	10344	1304	3422	1431	136	1194	999	142
110	15	20	11350	7328	12181	1761	3504	1942	263	1101	1220	248
110	20	•4-	1012	9855	18827	6828	26893			42244	2	2-
110	20	•6-	1990	9807	12857	2747	19560	180	53-	20483	377	165-
110	20	8	3294	9878	9713	1405	1888	21		1483	33	
110	20	10	4708	9897	9410	1146	2976	170	2-	1870	214	5-
110	20	12	6101	9880	10596	1276	3662	519	3	1918	543	5
110	20	14	7458	9847	12567	1632	4083	1047	40	1832	940	54
110	20	16	8787	9791	15016	2188	4341	1718	136	1705	1349	160
110	20	18	10099	9719	17811	2958	4500	2502	317	1571	1747	332
110	20	20	11599	9624	20837	3958	4591	3372	607	1442	2119	572
110	25	•6-	2046	12225	18281	4594	23935	325	113-	25065	681	354-
110	25	8	3340	12294	14445	2531	2595	36		1881	56	2-
110	25	10	4746	12511	14258	2131	3720	274	5-	2337	344	9-
110	25	12	6159	12280	16143	2399	4555	817	8	2385	856	12
110	25	14	7501	12216	19124	3069	5061	1633	81	2271	1465	109
110	25	16	8841	12120	22772	4099	5365	2659	266	2107	2088	314
110	25	18	10166	12001	26890	5513	5545	3848	612	1955	2687	641
110	25	20	11482	11819	31118	7263	5623	5123	1150	1766	5219	1083
110	30	•6-	2105	14656	24086	6854	28171	539	214-	29500	1130	671-
110	50	•8	5589	14700	19771	4026	2919	56	2-	2293	88	4-
110	30	10	4789	14706	19878	3499	4467	407	8-	2806	511	15-
110	30	12	6182	14651	22617	3979	5439	1190	15	2848	1246	24
110	30	14	7552	14550	26783	5096	6022	2351	144	2703	2110	194
110	30	16	8902	14387	31718	6762	6356	3789	461	2496	2976	543
110	50	18	10242	14188	37168	9003	6538	5429	1040	2282	3790	1089
110	30	20	11575	13926	42754	11761	6605	7170	1926	2075	4505	1815
110	35	•8	3440	17093	25574	5882	3460	84	3-	2718	132	7-
110	35	10	4835	17075	26139	5261	5213	572	12-	3275	719	23-
110	35	12	6230	16985	29879	6045	6310	1637	28	3304	1714	44
110	35	14	7607	16829	35350	7739	6957	3195	236	3122	2867	317
110	35	16	8970	16594	41663	10222	7315	5101	734	2872	4006	865
110	55	18	10325	16510	48555	15508	7495	7244	1627	2616	5057	1704
110	35	20	11675	15954	55437	17494	7542	9489	2969	2369	5962	2798
110	40	•8	3493	19487	31797	8097	4019	121	4-	3157	190	11-
110	40	•10	4884	19429	32990	7439	5963	774	17-	3747	973	32-
110	40	12	6282	19292	37858	8620	7172	2164	48	3755	2266	75
110	40	14	7668	19067	44680	11035	7871	4168	363	3533	5741	488
110	40	16	9045	18754	52506	14525	8247	6596	1102	3239	5181	1298
110	40	18	10414	18370	60791	19046	8415	9281	2396	2937	6479	2509
120	5	4-	846	2475	.2122	.0283	7625	0000	.0000	11978	0000	.0000
120	5	6-	1857	2494	1039	65	5202	4		5448	8	1-
120	5	8	3227	2498	651	25	382			500		
120	5	12	6196	2502	.0617	.0017	.850	.0022	.0000	.445	.0023	0000
120	5	14	7615	2500	719	21	967	48		434	43	
120	5	16	8995	2497	856	28	1042	82	1	409	64	1
120	5	18	10346	2494	1021	38	1094	124	3	382	86	3
120	5	20	11677	2503	1223	52	1136	173	6	357	109	6
120	10	•4-	898	4897	6836	1585	14510			22792		
120	10	6-	1891	4958	3869	465	10223	18	3-	10706	57	9-
120	10	8	3248	4981	2537	189	770	2		605	3	
120	10	10	4741	4988	2252	132	1328	25		834	32	
120	10	12	6209	4982	2432	136	1693	88		887	95	
120	10	14	7630	4983	2844	168	1926	191	2	864	172	3
120	10	16	9012	4979	3592	221	2077	328	9	816	257	11
120	10	18	10368	4985	4067	301	2185	495	24	765	346	25
120	10	20	11704	4965	4796	405	2251	684	49	707	430	46
120	15	6-	1938	7391	7941	1351	15002	46	11-	15710	96	33-
120	15	8	5280	7445	5500	599	1170	5		919	8	
120	15	10	4764	7459	4969	453	1993	58		1252	73	1-
120	15	12	6231	7457	5403	450	2536	201		1328	210	
120	15	14	7653	7454	6322	556	2881	451	8	1293	587	11
120	15	16	9041	7435	7522	732	3100	735	32	1217	577	38
120	15	18	10403	7401	8918	981	3241	1098	81	1131	766	85
120	15	20	11749	7368	10505	1317	5336	1513	163	1048	951	154
120	20	•6-	1992	9808	12809	2751	19557	96	28-	20481	201	08-
120	20	8	3320	9887	9546	1520	1584	10		1244	16	
120	20	10	4795	9908	8617	987	2661	106	2-	1672	155	3-
120	20	12	6259	9901	9423	1036	3372	360		1765	377	
120	20	14	7685	9682	11018	1280	3818	766	19	1714	688	26
120	20	16	9079	9837	13066	1679	4097	1297	76	1609	1019	90
120	20	18	10451	9794	15505	2254	4282	1935	191	1495	1551	200
120	20	20	11008	9713	18122	2994	4589	2645	380	1379	1662	358
120	25	•6-	2048	12226	18203	4563	23935	177	62-	25064	570	193-
120	25	8	3366	12307	13889	2375	2015	18		1582	28	
120	25	10	4832	12335	13083	1841	3332	171	3-	2093	215	6-
120	25	12	6294	12321	14400	1956	4201	568		2200	595	
120	25	14	7724	12273	16820	2417	4740	1197	39	2127	1074	53
120	25	16	9125	12206	19934	5171	5078	2016	150	1994	1583	177
120	25	18	10508	12105	23478	4215	5283	2979	369	1844	2079	387
120	25	20	11080	11977	27323	5568	5400	4050	727	1697	2545	685
120	30	•6-	2105	14659	25970	6801	28173	298	119-	29502	624	373-
120	50	•8	3415	14714	18997	3772	2463	28		1934	44	2-
120	30	10	4875	14740	18258	3026	4006	255	6-	2517	320	11-
120	30	12	6535	14708	20218	3253	5022	828	2	2630	867	2
120	30	14	7769	14631	23627	4028	5648	1726	70	2555	1549	95
120	30	16	9180	14526	27940	5277	6054	2886	262	2370	2267	309
120	30	18	10575	14360	32717	6961	6254	4229	633	2183	2952	663
120	30	20	11961	14163	37859	9120	6370	5706	1230	2001	5585	1159
120	35	8	3467	17116	24566	5507	2929	43	1-	2300	67	3-
120	55	•10	4918	17127	24051	4560	4684	360	9-	2943	452	17-
120	35	12	6579	17070	26792	4959	5837	1141	4	3056	1195	7
120	35	14	7819	16954	31315	6156	6541	2553	116	2935	2112	157
120	35	16	9239	16782	36872	8024	6960	3897	420	2733	3061	495
120	35	18	10648	16560	43046	10551	7196	5677	998	2512	3963	1046
120	35	20	12050	16273	49437	13694	7299	7594	1910	2293	4771	1800
120	40	•8	3520	19517	50520	7571	3413	62	2-	2680	97	5-
120	40	•10	4966	19495	50374	6451	5366	489	13-	3371	614	25-
120	40	12	6428	19404	34026	7095	6644	1512	9	3479	1584	15
120	40	14	7874	19241	39781	8829	7418	3081	181	3329	2766	243
120	40	16	9505	19005	46697	11474	7866	5057	633	3089	3972	746
120	40	18	10728	18693	54220	14986	8102	7304	1479	2828	5099	1549
120	40	20	12145	18301	61843	19271	8185	9682	2784	2571	6084	2624
130	5	4-	846	2475	.2122	.0283	7625	.0000	.0000	11978	.0000	0000
130	5	6-	1857	2494	1037	65	5202	2		5448	4	
130	5	8	3245	2498	653	23	318			250		
130	5	10	4801	2499	529	15	592	4		372	5	
150	5	12	6342	2491	549	14	778	15		408	16	
130	5	14	7832	2500	635	17	902	35		405	32	
150	5	16	9278	2506	753	22	985	63		387	49	
130	5	18	10693	2509	896	29	1041	97	2	363	68	2
150	5	20	12085	2496	1051	39	1075	135	4	338	85	4
130	10	•4-	898	4897	6857	1586	14511			22793		
130	10	6-	1892	4960	3865	464	10225	9	1-	10707	19	5-
130	10	8	3266	4983	2468	180	642	1		504	2	
130	10	10	4815	4989	2089	117	1185	16		745	20	
130	10	12	6354	4990	2190	113	1560	62		817	65	
130	10	14	7845	4991	2515	134	1801	142	1	808	127	1
130	10	16	9294	4989	2973	173	1960	250	5	770	197	6
130	10	18	10712	4967	3503	228	2060	381	15	719	266	15
150	10	20	12108	4980	4168	509	2144	540	31	673	359	29

APPENDIX I

STOKES-STRUIK THIRD-APPROXIMATION COEFFICIENTS FOR AN ASSEMBLAGE OF WAVE CONDITIONS (CONTINUED)

d	H	T	L	η_1	η_2	η_3	V_1	V_2	V_3	Q_1	Q_2	Q_3
130	15	8	3298	7448	.5349	.0575	.977	.0003	.0000	.768	.0004	.0000
130	15	10	4038	7463	4613	583	1781	36		1119	46	
130	15	12	6374	7469	4069	575	2338	141		1224	147	
130	15	14	7866	7457	5584	444	2692	319	4	1268	286	5
130	15	16	9318	7446	6390	572	2924	561	18	1148	440	21
130	15	18	10742	7422	7785	737	3076	853	49	1074	597	52
130	15	20	12146	7407	9178	1012	3185	1199	104	1001	733	98
130	20	• 6-	1992	9809	12704	2722	19356	51	15-	20479	107	47-
130	20	8	3338	9890	9084	1260	1326	3		1042	8	
130	20	10	4868	9919	8012	873	2380	67	1-	1495	84	2-
130	20	12	6401	9917	8497	864	5109	252	1-	1628	264	2-
130	20	14	7894	9902	9768	1028	3574	560	9	1604	309	12
130	20	16	9351	9067	11494	1320	3872	992	45	1520	779	51
130	20	18	10703	9829	13369	1745	4069	1509	117	1420	1053	122
130	20	20	12198	9790	15933	2321	4204	2106	244	1321	1323	230
130	25	• 6-	2049	12227	18162	4546	23934	96	39-	23064	201	105-
130	25	8	3384	12314	13498	2268	1692	9		1329	14	
130	25	10	4904	12334	12177	1632	2984	107	2-	1073	135	4-
130	25	12	6434	12340	13009	1656	3877	399	2-	2050	417	3-
130	25	14	7929	12315	14970	1951	4443	889	18	1995	798	25
130	25	16	9393	12266	17616	2508	4809	1347	86	1888	1215	101
130	25	18	10034	12196	20730	3304	3042	2340	228	1760	1634	239
130	25	20	12260	12101	24166	4351	5187	3238	470	1630	2035	443
130	30	• 6-	2106	14660	23905	6772	20174	164	66-	29503	344	206-
130	30	• 8	3434	14726	18434	3599	2074	14		1629	22	
130	30	10	4945	14769	17009	2665	3392	161	4-	2237	202	7-
130	30	12	6472	14753	18309	2729	4641	382	3-	2430	609	5-
130	30	14	7970	14703	21106	3269	5507	1285	33	2382	1153	45
130	30	16	9441	14612	24765	4189	5722	2218	150	2247	1742	177
130	30	18	10892	14491	29010	5486	5981	3331	392	2088	2325	410
130	30	20	12331	14340	33649	7177	6134	4580	798	1927	2878	752
130	35	• 8	3487	17133	23850	5249	2475	21		1943	34	1-
130	35	10	4989	17166	22422	4049	4206	228	6-	2643	286	11-
130	35	12	6514	17135	24313	4172	5401	804	4-	2828	842	6-
130	35	14	8016	17051	28046	5011	6153	1755	56	2762	1575	73
130	35	16	9494	16920	32861	6417	6619	3007	242	2399	2362	285
130	35	18	10957	16740	38339	8364	6897	4485	621	2407	3131	650
130	35	20	12410	16516	44218	10860	7049	6121	1247	2214	3846	1175
130	40	• 8	3540	19539	29609	7206	2892	31		2272	49	2-
130	40	10	5036	19546	28333	5731	4826	310	9-	3032	390	17-
130	40	12	6560	19494	30947	5985	6157	1068	5-	3224	1118	7-
130	40	14	8066	19371	35732	7214	6989	2302	88	3137	2066	118
130	40	16	9533	19186	41783	9224	7495	3913	367	2943	3073	433
130	40	18	11028	18941	48573	11972	7788	5796	926	2718	4047	970
130	40	20	12493	18631	35711	13432	7952	7852	1833	2492	4933	1728
140	5	4-	046	2475	2122	.0283	7623	.0000	.0000	11978	.0000	.0000
140	5	6-	1858	2494	1036	65	5201	1		3447	2	
140	5	8	3258	2498	620	23	265			208		
140	5	10	4863	2499	497	13	528	2		332	3	
140	5	12	6472	2505	304	12	721	11		377	11	
140	5	14	8030	2502	567	14	845	26		379	24	
140	5	16	9542	2497	660	17	926	48		364	38	
140	5	18	11019	2498	780	23	984	76	1	343	53	1
140	5	20	12471	2507	926	31	1028	109	3	323	68	2
140	10	• 4-	898	4897	6836	1385	14509			22791		
140	10	6-	1892	4958	3860	464	10221	5		10704	10	2-
140	10	8	3279	4983	2420	173	333			420		
140	10	10	4077	4990	1965	106	1058	10		665	12	
140	10	12	6483	4991	1994	96	1438	44		753	46	
140	10	14	8042	4990	2246	110	1685	106		756	95	
140	10	16	9535	4988	2626	138	1850	193	3	726	152	4
140	10	18	11055	4983	3096	180	1961	301	9	685	210	10
140	10	20	12491	4968	3628	238	2037	428	20	640	269	19
140	15	6-	1939	7392	7919	1346	14999	13	3-	13707	26	9-
140	15	8	3311	7451	5246	555	815	1		640	2	
140	15	10	4899	7468	4343	346	1591	23		1000	29	
140	15	12	6502	7463	4425	318	2153	99		1127	104	
140	15	14	8061	7466	5001	364	2522	239	2	1132	214	2
140	15	16	9577	7458	5844	458	2765	434	10	1086	341	12
140	15	18	11062	7444	6880	399	2928	676	31	1022	472	32
140	15	20	12524	7441	8106	795	3048	963	68	937	605	64
140	20	• 6-	1993	9809	12770	2718	19556	27	8-	20479	57	25-
140	20	8	3352	9893	8903	1220	1109	2		871	4	
140	20	10	4929	9926	7542	790	2128	42		1337	53	1-
140	20	12	6528	9934	7764	739	2870	178	1-	1303	187	2-
140	20	14	8087	9919	8765	845	3352	425	4	1504	382	5
140	20	16	9607	9893	10224	1061	3666	769	25	1440	604	29
140	20	18	11098	9866	12019	1384	3878	1194	73	1354	833	76
140	20	20	12568	9832	14074	1823	4022	1689	159	1264	1061	150

d	H	T	L	η_1	η_2	η_3	V_1	V_2	V_3	Q_1	Q_2	Q_3
140	25	• 6-	2049	12229	18140	.4538	23935	.0052	.0018-	25065	.0109	.0037-
140	25	8	3390	12320	13225	2194	1418	4		1114	7	
140	25	10	4964	12367	11469	1477	2671	68	1-	1678	83	2-
140	25	12	6539	12369	11893	1399	3581	202	3-	1875	296	4-
140	25	14	8119	12347	13462	1610	4174	667	8	1873	599	11
140	25	16	9644	12307	13704	2023	4358	1200	49	1790	942	58
140	25	18	11142	12248	18399	2627	4809	1855	142	1679	1293	149
140	25	20	12622	12174	21456	3437	4973	2604	307	1562	1636	289
140	30	• 6-	2106	14662	25871	6756	28173	91	36-	29505	190	114-
140	30	• 8	3448	14734	18070	3479	1744	7		1370	11	
140	30	10	5005	14793	16038	2433	3220	102	2-	2023	128	4-
140	30	12	6595	14707	16765	2339	4292	413	4-	2247	432	7-
140	30	14	8157	14751	19021	2703	4988	966	15	2238	867	20
140	30	16	9687	14687	22175	3399	5435	1723	87	2134	1353	102
140	30	18	11194	14591	25905	4400	5721	2650	246	1997	1850	258
140	30	20	12685	14464	30029	5718	5899	3701	525	1833	2325	494
140	35	• 8	3501	17146	23344	3070	2087	11		1639	17	
140	35	10	5049	17196	21144	3670	3773	144	4-	2372	182	7-
140	35	12	6633	17188	22311	3586	5001	572	6-	2619	399	10-
140	35	14	8199	17123	23344	4161	5791	1321	25	2599	1106	54
140	35	16	9735	17027	29519	5229	6296	2344	141	2472	1841	166
140	35	18	11252	16881	34368	6742	6609	3577	392	2307	2497	410
140	35	20	12756	16712	39752	8741	6803	4977	827	2137	3127	780
140	40	• 8	3555	19352	28952	6950	2446	16		1921	25	
140	40	10	5096	19388	26736	3198	4538	198	6-	2726	240	11-
140	40	12	6679	19362	28432	5152	5706	760	9-	2988	796	13-
140	40	14	8245	19470	32370	6009	6386	1736	40	2956	1358	54
140	40	16	9789	19329	37647	7545	7141	5036	214	2884	2400	232
140	40	18	11316	19131	43724	9704	7478	4637	587	2610	3237	614
140	40	20	12832	18802	30286	12486	7670	6402	1220	2410	4022	1150
150	5	4-	846	2473	.2122	.0283	7623	.0000	.0000	11978	.0000	0000
150	5	6-	1858	2492	1034	65	5197			5442	1	
150	5	8	3267	2498	612	22	220			172		
150	5	10	4914	2498	472	12	471	2		296	2	
150	5	12	6387	2498	462	11	663	8		347	8	
150	5	14	8212	2500	511	12	792	20		355	18	
150	5	16	9788	2503	392	14	878	38		345	30	
150	5	18	11326	2510	698	19	940	61		328	42	
150	5	20	12836	2503	815	24	980	87	2	308	35	2
150	10	• 4-	898	4897	6836	1383	14509			22791		
150	10	6-	1892	4938	3838	463	10221	2		10704	5	1-
150	10	8	3288	4984	2387	171	444			349		
150	10	10	4928	4989	1866	97	944	6		593	8	
150	10	12	6598	4996	1839	84	1327	31		695	33	
150	10	14	8223	4993	2031	92	1581	80		710	72	
150	10	16	9800	4998	2355	113	1733	151	2	688	119	2
150	10	18	11340	4986	2751	145	1867	240	6	652	160	6
150	10	20	12853	4998	3244	191	1955	348	13	614	219	13
150	15	6-	1939	7591	7914	1344	14997	7	2-	15705	14	3-
150	15	8	3320	7451	5172	543	679			553		
150	15	10	4950	7469	4128	318	1420	14		892	18	
150	15	12	6616	7471	4084	277	1988	71		1041	74	
150	15	14	8240	7462	4514	304	2364	180		1061	161	
150	15	16	9819	7464	5232	374	2618	339	6	1028	266	7
150	15	18	11363	7433	6123	481	2789	339	19	973	376	20
150	15	20	12882	7438	7159	628	2908	774	44	914	487	42
150	20	• 6-	1993	9810	12765	2716	19557	15	4-	20480	30	13-
150	20	8	3361	9896	8777	1193	926	1		727	2	
150	20	10	4979	9935	7179	728	1903	26		1195	33	
150	20	12	6640	9938	7157	643	2650	127	1-	1387	133	2-
150	20	14	8264	9932	7943	709	3148	322	1	1413	289	2
150	20	16	9846	9917	9185	871	3477	602	14	1365	473	17
150	20	18	11395	9900	10750	1121	3702	955	46	1292	667	48
150	20	20	12920	9836	12510	1454	3850	1366	105	1209	858	99
150	25	• 6-	2049	12228	18126	4532	23934	28	10-	25063	59	31-
150	25	8	3408	12324	13033	2143	1187	2		933	3	
150	25	10	5015	12377	10915	1361	2389	43		1501	34	1-
150	25	12	6670	12389	10993	1222	3311	201	2-	1734	211	4-
150	25	14	8294	12372	12225	1354	3923	503	3	1761	434	4
150	25	16	9879	12332	14109	1659	4323	939	28	1697	737	33
150	25	18	11434	12293	16474	2129	4593	1483	90	1603	1035	94
150	25	20	12969	12231	19214	2775	4780	2122	204	1502	1333	193
150	30	• 6-	2107	14661	23849	6746	28174	30	20-	29504	105	63-
150	30	• 8	3458	14741	17801	3396	1464	3		1150	5	
150	30	10	5055	14805	15261	2241	2884	64	1-	1812	81	3-
150	30	12	6705	14814	15508	2044	3970	295	4-	2079	308	6-
150	30	14	8329	14787	17299	2280	4692	732	5	2106	657	7
150	30	16	9918	14737	19988	2801	5163	1353	50	2028	1063	39
150	30	18	11481	14671	23296	3587	5476	2128	157	1912	1485	164

APPENDIX I
STOKES-STRUIK THIRD-APPROXIMATION COEFFICIENTS FOR AN ASSEMBLAGE OF WAVE CONDITIONS (CONTINUED)

d	H	T	L	η_1	η_2	η_3	V_1	V_2	V_3	O_1	O_2	O_3
150	30	20	13024	14566	26978	.4629	5675	3019	0350	1783	1897	0330
150	35	• 8	3512	17152	22976	4942	1757	5		1380	8	
150	35	10	5099	17214	20126	3381	3385	92	2-	2127	115	4-
150	35	12	6744	17221	20650	3136	4629	408	6-	2424	428	9-
150	35	14	8368	17179	23099	3517	5454	1003	10	2448	900	13
150	35	16	9963	17101	26679	4324	5989	1841	81	2352	1446	96
150	35	18	11533	16989	30990	5516	6334	2877	250	2211	2008	262
150	35	20	13088	16842	35794	7095	6552	4064	553	2058	2554	521
150	40	• 8	3566	19562	28486	6771	2066	8		1623	13	
150	40	10	5145	19616	25462	4792	3896	126	4-	2448	158	7-
150	40	12	6786	19611	26356	4515	5288	544	9-	2769	570	14-
150	40	14	8412	19553	29577	5096	6211	1320	16	2787	1185	21
150	40	16	10012	19435	34125	6264	6802	2405	124	2671	1889	147
150	40	18	11591	19269	39519	7962	7175	3733	375	2505	2606	392
150	40	20	13157	19071	45515	10207	7406	5249	0821	2327	3298	.0774
160	5	4-	846	2475	2123	02827	7626	.0000	.00000	11979	.0000	.00000
160	5	6-	1858	2494	1035	650	5200			5446		
160	5	8	3273	2498	606	219	182			143		
160	5	10	4956	2498	452	115	420			264	1	
160	5	12	6688	2505	432	94	614	6		321	6	
160	5	14	8378	2499	465	98	743	15		333	14	
160	5	16	10017	2498	532	117	830	30	1	326	23	1
160	5	18	11615	2512	627	151	897	49	5	313	34	5
160	5	20	13182	2501	726	194	936	71	11	294	45	10
160	10	• 4-	898	4897	6836	15853	14509			22791		
160	10	6-	1892	4958	3857	4631	10221	1	2-	10703	3	6-
160	10	8	3294	4984	2364	1683	369			290		
160	10	10	4970	4988	1789	905	841	4		529	5	
160	10	12	6699	4992	1707	739	1224	22	1-	641	23	2-
160	10	14	8388	4992	1852	780	1484	61		666	55	
160	10	16	10028	4980	2109	927	1656	118	10	650	93	11
160	10	18	11628	4992	2469	1184	1781	193	36	622	135	38
160	10	20	13197	4984	2876	1529	1865	282	88	586	177	83
160	15	6-	1939	7392	7914	13441	14999	3	8-	15707	7	25-
160	15	8	3327	7451	5120	5340	565			443		
160	15	10	4992	7471	3961	2975	1268	9		797	11	2-
160	15	12	6717	7473	3799	2453	1836	50	4-	961	53	6-
160	15	14	8405	7474	4131	2599	2223	137		998	123	
160	15	16	10046	7470	4727	3112	2483	267	33	975	210	39
160	15	18	11648	7468	5508	3947	2663	434	123	930	303	129
160	15	20	13222	7441	6391	5071	2783	631	296	874	396	279
160	20	• 6-	1993	9809	12759	27140	19555	8	23-	20478	16	72-
160	20	8	3368	9898	8690	11736	772			606		
160	20	10	5021	9936	6886	6800	1699	17	2-	1067	21	4-
160	20	12	6740	9939	6659	5686	2447	91	10-	1281	95	15-
160	20	14	8427	9941	7263	6056	2959	245		1328	220	
160	20	16	10070	9930	8312	7257	3300	475	81	1296	373	95
160	20	18	11677	9912	9659	9176	3533	769	293	1233	537	307
160	20	20	13257	9886	11234	11835	3695	1118	704	1161	703	663
160	25	• 6-	2050	12228	18119	45293	23934	15	53-	25063	32	168-
160	25	8	3415	12327	12898	21077	993	1		780	2	
160	25	10	5056	12385	10479	12724	2137	27	5-	1342	34	9-
160	25	12	6769	12398	10244	10833	3061	144	19-	1603	151	29-
160	25	14	8455	12389	11193	11582	3690	386	3	1656	346	4
160	25	16	10100	12366	12809	13892	4109	743	161	1614	583	189
160	25	18	11712	12324	14850	17513	4390	1196	575	1532	835	602
160	25	20	13299	12280	17242	22547	4585	1735	1371	1440	1090	1292
160	30	• 6-	2107	14661	23838	67416	28174	28	110-	29504	58	347-
160	30	• 8	3466	14745	17609	33376	1228	2		964	3	
160	30	10	5096	14817	14653	20962	2581	41	8-	1622	51	16-
160	30	12	6803	14836	14478	18173	3674	211	32-	1924	221	50-
160	30	14	8488	14822	15877	19561	4419	559	9	1983	502	12
160	30	16	10136	14779	18163	23473	4910	1071	285	1928	841	336
160	30	18	11754	14732	21080	29662	5244	1722	1005	1830	1202	1052
160	30	20	13350	14653	24396	38028	5465	2484	2371	1717	1561	2235
160	35	• 8	3519	17157	22720	48541	1478	3		1161	4	1-
160	35	10	5140	17235	19334	31644	3034	58	14-	1907	73	26-
160	35	12	6841	17251	19291	27902	4287	293	50-	2245	307	79-
160	35	14	8525	17223	21220	30216	5139	767	20	2306	688	26
160	35	16	10177	17166	24299	36351	5702	1459	466	2239	1146	549
160	35	18	11801	17073	28104	45739	6072	2331	1605	2119	1627	1681
160	35	20	13406	16956	32440	58453	6315	3348	3749	1984	2104	3533
160	40	• 8	3574	19570	28154	66446	1743	4		1369	6	2-
160	40	10	5187	19641	24455	44829	3496	80	22-	2197	101	41-
160	40	12	6882	19651	24643	40208	4901	391	73-	2566	410	115-
160	40	14	8566	19607	27196	43825	5855	1010	39	2628	906	53
160	40	16	10222	19523	31147	52801	6483	1909	717	2546	1499	845
160	40	18	11854	19392	35965	66336	6890	3033	2419	2405	2117	2533
170	5	4-	846	2475	2122	02827	7625	.0000	00000	11978	0000	00000
170	5	6-	1858	2494	1036	650	5201			5447		
170	5	8-	3278	2498	602	217	3924	8	4-	3082	13	9-
170	5	10	4990	2497	437	109	374			235		
170	5	12	6779	2501	404	84	566	4		296	4	
170	5	14	8531	2490	425	84	696	12		312	10	
170	5	16	10231	2500	484	99	789	24		310	19	
170	5	18	11888	2501	561	124	852	39	3	297	27	3
170	5	20	13511	2499	651	158	896	58	7	282	37	7
170	10	• 4-	898	4897	6836	15854	14510			22792		
170	10	6-	1892	4958	3857	4630	10221		1-	10703	1	3-
170	10	8-	3299	4984	2347	1665	7797	34	32-	6124	54	76-
170	10	10	5004	4993	1732	858	751	2		472	3	
170	10	12	6789	4994	1603	665	1131	16		592	17	1-
170	10	14	8540	4991	1703	674	1395	47		626	42	
170	10	16	10241	4994	1929	788	1576	94	5	619	74	6
170	10	18	11899	5000	2236	986	1703	157	23	594	110	24
170	10	20	13525	4999	2601	1264	1792	233	60	563	147	57
170	15	6-	1939	7392	7913	13438	14999	2	4-	15707	4	13-
170	15	8-	3331	7451	5085	5282	11584	81	111-	9098	127	262-
170	15	10	5026	7473	3831	2817	1131	6		710	7	1-
170	15	12	6806	7483	3574	2213	1698	36	3-	889	38	5-
170	15	14	8556	7478	3806	2251	2091	105	2-	938	95	3-
170	15	16	10257	7475	4305	2629	2358	212	18	926	167	22
170	15	18	11918	7479	4990	3286	2546	353	79	889	247	83
170	15	20	13547	7468	5789	4199	2677	522	202	841	328	191
170	20	• 6-	1993	9809	12757	27133	19555	4	12-	20478	9	38-
170	20	8-	3373	9901	8632	11610	15272	152	272-	11995	239	640-
170	20	10	5055	9939	6658	6437	1516	10	1-	953	13	3-
170	20	12	6829	9951	6265	5127	2264	65	7-	1185	68	12-
170	20	14	8577	9949	6696	5252	2784	188	5-	1249	169	6-
170	20	16	10280	9941	7579	6141	3136	378	44	1232	297	52
170	20	18	11944	9933	8764	7656	3380	626	188	1180	437	197
170	20	20	13578	9905	10143	9751	3548	922	478	1115	579	450
170	25	• 6-	2050	12228	18115	45279	23934	8	29-	25063	17	91-
170	25	8-	3420	12329	12804	20831	18846	253	548-	14802	398	1292-
170	25	10	5091	12390	10134	12046	1909	17	3-	1199	21	5-
170	25	12	6857	12407	9630	9757	2831	104	14-	1482	109	22-
170	25	14	8604	12400	10326	10053	3473	296	8-	1559	266	11-
170	25	16	10308	12390	11705	11790	3909	591	89	1535	465	105
170	25	18	11975	12350	13479	14616	4201	973	369	1466	679	387
170	25	20	13616	12305	15580	18592	4404	1430	930	1384	898	877
170	30	• 6-	2107	14662	23832	67389	28174	15	61-	29504	32	191-
170	30	• 8-	3471	14748	17475	32969	22325	390	982-	17534	612	2314-
170	30	10	5131	14826	14172	19848	2309	26	5-	1451	32	9-
170	30	12	6890	14854	13625	16392	3401	152	25-	1781	159	39-
170	30	14	8635	14840	14660	16997	4161	430	12-	1867	386	16-
170	30	16	10341	14807	16603	19927	4672	852	158	1835	669	187
170	30	18	12014	14772	19170	24818	5022	1402	647	1753	979	677
170	30	20	13661	14698	22104	31472	5255	2052	1614	1651	1289	1521
170	35	•8-	3524	17161	22539	47922	25717	568	1619-	20198	892	3815-
170	35	10	5175	17248	18700	29960	2717	37	8-	1707	47	15-
170	35	12	6927	17274	18163	25183	3970	212	39-	2079	222	61-
170	35	14	8670	17258	19635	26332	4844	590	15-	2174	529	21-
170	35	16	10379	17210	22258	30945	5430	1163	261	2132	914	307
170	35	18	12057	17139	25630	38416	5823	1902	1037	2033	1328	1086
170	35	20	13713	17049	29550	48746	6090	2778	2568	1913	1745	2420
170	40	• 8-	3580	19575	27918	65557	29030	794	2510-	22800	1247	5914-
170	40	10	5221	19659	23651	42435	3135	51	13-	1969	64	24-
170	40	12	6968	19686	23225	36338	4543	283	58-	2379	296	91-
170	40	14	8709	19654	25194	38252	5524	778	17-	2479	698	23-
170	40	16	10421	19590	28594	45083	6180	1524	404	2427	1197	476
170	40	18	12105	19485	32881	55903	6616	2479	1567	2309	1731	1641
170	40	20	13770	19346	37786	70640	6902	3601	3832	2168	2263	3612
180	5	4-	846	2475	2122	02826	7625	0000	00000	11978	0000	00000
180	5	6-	1858	2494	1035	650	5200			5446		
180	5	8-	3281	2498	599	215	3922	6	3-	3080	9	6-
180	5	10	5018	2500	426	104	333			209		
180	5	12	6858	2500	381	76	522	3		273	3	
180	5	14	8671	2500	397	75	657	9		295	8	
180	5	16	10431	2498	443	85	749	19		294	15	
180	5	18	12146	2500	510	104	814	32	2	284	22	2
180	5	20	13824	2509	594	133	863	49	5	271	31	5
180	10	• 4-	898	4897	6837	15856	14510			22793		
180	10	6-	1892	4959	3858	4631	10222			10705		2-
180	10	8-	3302	4986	2339	1655	7797	24	22-	6124	37	52-
180	10	10	5032	4994	1686	822	669	2		420	2	
180	10	12	6868	4999	1519	607	1046	12		547	12	1-

APPENDIX I

STOKES-STRUIK THIRD-APPROXIMATION COEFFICIENTS FOR AN ASSEMBLAGE OF WAVE CONDITIONS (CONTINUED)

d	H	T	L	η_1	η_2	η_3	V_1	V_2	V_3	a_1	a_2	a_3
180	10	16	10441	4993	1766	00673	1497	.0075	.00003	588	.0059	.00005
180	10	18	12156	4992	2028	825	1625	128	15	567	89	16
180	10	20	13856	4990	2346	1044	1717	195	41	559	121	39
180	15	6-	1939	7392	7912	13436	14999		2-	15707	2	7-
180	15	8-	3335	7452	5061	5242	11580	56	77-	9095	88	181-
180	15	10	5054	7474	3727	2694	1008	4		633	4	
180	15	12	6885	7481	3379	2014	1568	26	2-	821	27	4-
180	15	14	8695	7484	3535	1980	1969	81	3-	884	73	4-
180	15	16	10456	7481	3952	2254	2243	170	9	881	133	11
180	15	18	12173	7461	4517	2743	2428	287	50	848	200	53
180	15	20	13856	7448	5213	3460	2562	430	137	805	270	129
180	20	• 6-	1993	9810	12756	27130	19555	2	6-	20478	5	20-
180	20	8-	3376	9899	8585	11510	15263	105	188-	11987	165	444-
180	20	10	5083	9944	6482	6162	1353	7		850	8	1-
180	20	12	6907	9956	5931	4678	2093	47	5-	1096	49	8-
180	20	14	8715	9955	6219	4618	2622	145	6-	1177	130	9-
180	20	16	10477	9957	6970	5281	2986	303	23	1173	238	27
180	20	18	12196	9927	7967	6429	3230	511	120	1128	357	126
180	20	20	13884	9933	9240	8172	3415	768	329	1073	482	310
180	25	• 6-	2050	12228	18114	45272	23934	4	16-	25063	9	49-
180	25	8-	3423	12330	12738	20659	18840	176	383-	14797	277	902-
180	25	10	5119	12396	9862	11524	1704	11	2-	1071	14	3-
180	25	12	6935	12415	9121	8906	2619	75	11-	1371	78	17-
180	25	14	8740	12413	9600	8852	3272	228	12-	1469	205	16-
180	25	16	10503	12408	10765	10138	3721	474	47	1461	372	55
180	25	18	12226	12379	12329	12385	4027	798	238	1406	557	250
180	25	20	13919	12350	14222	15623	4243	1192	642	1333	749	605
180	30	• 6-	2107	14662	23829	67376	28175	8	34-	29504	18	105-
180	30	• 8-	3474	14749	17380	32683	22320	272	690-	17530	428	1625-
180	30	10	5159	14834	13792	18988	2064	16	3-	1297	21	5-
180	30	12	6968	14864	12907	14966	3147	110	18-	1648	115	29-
180	30	14	8770	14862	13647	14995	3923	332	20-	1761	298	26-
180	30	16	10533	14830	15280	17147	4449	683	84	1747	537	99
180	30	18	12261	14808	17545	21042	4815	1150	418	1681	803	437
180	30	20	13959	14743	20163	26413	5061	1708	1110	1590	1073	1047
180	35	• 8-	3528	17165	22411	47490	25713	399	1145-	20195	627	2697-
180	35	10	5203	17259	18196	28655	2432	24	5-	1528	30	9-
180	35	12	7004	17290	17217	23011	3677	155	29-	1925	160	46-
180	35	14	8804	17284	18285	23240	4569	456	29-	2050	409	39-
180	35	16	10569	17249	20519	26689	5175	933	139	2032	733	164
180	35	18	12301	17192	23500	32649	5588	1562	671	1951	1090	703
180	35	20	14007	17129	27057	41127	5875	2320	1775	1846	1458	1673
180	40	• 8-	3584	19580	27752	64934	29028	561	1785-	22798	881	4207-
180	40	10	5250	19673	23010	40573	2808	33	8-	1764	41	14-
180	40	12	7044	19709	22026	33223	4210	205	44-	2204	214	68-
180	40	14	8842	19694	23493	33819	5213	602	40-	2340	540	54-
180	40	16	10609	19644	26399	38959	5895	1224	218	2315	961	257
190	5	4-	846	2475	2122	02826	7625	0000	.00000	11978	0000	.00000
190	5	6-	1858	2494	1035	650	5200			5445		
190	5	8-	3283	2497	597	214	3920	4	2-	3079	6	4-
190	5	10	5041	2498	416	101	296			186		
190	5	12	6928	2501	364	71	485	2		253	2	
190	5	14	8799	2494	369	66	617	7		277	6	
190	5	16	10619	2500	409	73	713	15		280	12	
190	5	18	12389	2489	462	87	776	26	1	271	18	1
190	5	20	14122	2506	540	111	829	40	4	260	25	3
190	10	• 4-	898	4897	6836	15853	14509			22791		
190	10	6-	1892	4958	3857	4629	10221			10703		
190	10	8-	3304	4983	2328	1643	7790	16	15-	6118	25	36-
190	10	10	5054	4992	1648	791	595			374	1	
190	10	12	6938	4999	1446	560	966	8		506	9	
190	10	14	8808	4997	1478	527	1237	28		555	25	1-
190	10	16	10627	4998	1632	585	1425	61	1	560	48	1
190	10	18	12399	4995	1858	703	1556	105	10	543	74	10
190	10	20	14133	4993	2140	880	1651	161	28	519	101	27
190	15	6-	1939	7392	7912	13436	14999		1-	15707	1	4-
190	15	8-	3337	7453	5046	5217	11579	38	53-	9094	60	125-
190	15	10	5077	7474	3644	2598	897	2		564	3	
190	15	12	6954	7482	3219	1858	1449	19	2-	759	20	3-
190	15	14	8822	7482	3300	1759	1854	63	3-	832	57	4-
190	15	16	10641	7480	3645	1953	2134	137	4	838	107	5
190	15	18	12415	7480	4158	2354	2331	237	32	814	166	34
190	15	20	14152	7475	4785	2942	2471	361	95	776	227	90
190	20	• 6-	1993	9810	12755	27128	19555	1	3-	20478	2	11-
190	20	8-	3378	9900	8555	11447	15259	73	130-	11984	114	307-
190	20	10	5106	9944	6337	5940	1206	4		757	5	
190	20	12	6977	9959	5651	4316	1935	34	4-	1013	36	6-
190	20	14	8841	9960	5814	4112	2470	113	7-	1109	101	9-
190	20	16	10661	9956	6430	4576	2841	244	11	1116	191	13
190	20	18	12436	9946	.7325	.05508	3099	.0422	.00078	1082	.0294	.00081
190	20	20	14177	9935	8425	6878	5282	640	227	1051	402	214
190	25	• 6-	2050	12229	18115	45270	23934	2	9-	25064	5	27-
190	25	8-	3426	12329	12689	20532	18834	122	267-	14792	192	428-
190	25	10	5141	12399	9644	11115	1520	7		955	8	2-
190	25	12	7004	12422	8696	8225	2422	54	8-	1268	57	12-
190	25	14	8866	12424	8985	7894	3085	177	13-	1385	159	17-
190	25	16	10685	12407	9935	8788	3541	381	22	1391	299	26
190	25	18	12463	12408	11349	10628	3865	660	154	1349	460	161
190	25	20	14208	12371	13013	13221	4086	998	444	1283	627	418
190	30	• 6-	2107	14662	23828	67370	28175	5	18-	29505	10	58-
190	30	• 8-	3477	14750	17314	32483	22315	190	484-	17527	299	1139-
190	30	10	5182	14843	13495	18327	1844	10	2-	1158	13	3-
190	30	12	7036	14872	12307	13821	2912	80	13-	1525	83	21-
190	30	14	8894	14873	12772	13369	3699	258	21-	1660	231	29-
190	30	16	10714	14861	14167	14965	4243	552	40	1666	433	48
190	30	18	12495	14825	16118	17999	4616	948	268	1611	662	281
190	30	20	14245	14775	18474	22390	4876	1430	769	1532	899	725
190	35	• 8-	5551	17168	22323	47191	25711	280	807-	20193	440	1902-
190	35	10	5226	17268	17796	27637	2174	15	3-	1366	19	5-
190	35	12	7072	17310	16436	21286	3405	111	21-	1783	116	33-
190	35	14	8927	17307	17155	20756	4311	354	32-	1935	318	44-
190	35	16	10748	17281	19025	23289	4936	753	68	1938	592	80
190	35	18	12532	17234	21653	28046	5365	1290	435	1873	900	454
190	35	20	14288	17167	24805	34880	5662	1942	1229	1779	1220	1158
190	40	• 8-	3586	19581	27630	64479	29024	596	1267-	22795	623	2984-
190	40	10	5273	19684	22499	39116	2514	21	4-	1579	26	8-
190	40	12	7112	19731	21029	30735	3901	149	32-	2043	156	50-
190	40	14	8963	19724	22032	30234	4921	468	46-	2209	420	65-
190	40	16	10785	19688	24502	34041	5625	988	109	2209	776	128
190	40	18	12574	19617	27871	40992	6104	1684	658	2131	1176	689
190	40	20	14336	19526	31896	50936	6435	2528	1845	2022	1589	1739
200	5	4-	846	2475	.2122	02826	7.625	.0000	00000	11978	.0000	.00000
200	5	6-	1858	2494	1035	650	5201			5446		
200	5	8-	3284	2498	596	213	3920	3	1-	3079	4	3-
200	5	10	5059	2501	410	98	264			166		
200	5	12	6990	2501	348	66	446	1		234	2	
200	5	14	8917	2504	349	60	584	5		262	5	
200	5	16	10794	2499	379	64	679	12		266	10	
200	5	18	12620	2504	431	76	748	22		261	15	
200	5	20	14407	2497	491	94	794	34	2	250	21	2
200	10	• 4-	898	4897	6836	15853	14509			22791		
200	10	6-	1892	4958	3857	4629	10221			10703		
200	10	8-	3305	4984	2324	1639	7790	11	10-	6118	17	25-
200	10	10	5073	4997	1621	771	530			333		
200	10	12	6999	4995	1383	520	892	6		467	6	
200	10	14	8925	5004	1392	476	1167	22		524	20	1-
200	10	16	10802	4999	1515	513	1358	49		533	39	
200	10	18	12629	4994	1711	606	1491	87	6	521	61	6
200	10	20	14417	4991	1960	748	1588	135	20	499	85	18
200	15	6-	1939	7392	7911	13434	14998			15706		2-
200	15	8-	3338	7454	5035	5199	11578	26	36-	9093	41	86-
200	15	10	5095	7478	3582	2527	799	1		502	2	
200	15	12	7015	7481	3083	1730	1339	14	1-	701	14	2-
200	15	14	8939	7475	3094	1577	1745	49	3-	783	44	3-
200	15	16	10815	7483	3386	1714	2033	111	1	798	87	2
200	15	18	12644	7480	3829	2028	2233	196	21	780	137	22
200	15	20	14433	7479	4390	2508	2378	304	66	747	191	62
200	20	• 6-	1993	9810	12755	27129	19556		2-	20479	1	6-
200	20	8-	3380	9903	8539	11411	15260	50	90-	11985	79	213-
200	20	10	5124	9947	6226	5773	1074	3		675	5	
200	20	12	7037	9961	5417	4024	1789	25	3-	937	26	4-
200	20	14	8958	9973	5479	3712	2331	88	6-	1046	79	8-
200	20	16	10833	9960	5975	4018	2707	197	4	1063	155	4
200	20	18	12663	9948	6750	4748	2970	349	49	1037	244	52
200	20	20	14456	9951	7749	5886	3164	539	158	994	339	149
200	25	• 6-	2050	12229	18114	45272	23935	1	5-	25065	3	14-
200	25	8-	3427	12332	12660	20458	18834	85	186-	14792	133	437-
200	25	10	5160	12402	9473	10798	1355	4		852	5	
200	25	12	7065	12427	8340	7673	2240	39	5-	1173	41	8-
200	25	14	8981	12431	8456	7112	2909	138	12-	1306	124	16-
200	25	16	10857	12425	9252	7741	3378	309	8	1326	243	9
200	25	18	12689	12407	10458	9160	3704	545	98	1293	381	102
200	25	20	14485	12393	11976	11318	3939	840	309	1237	528	291
200	30	• 6-	2107	14663	23829	67371	28176	3	10-	29506	5	32-
200	30	• 8-	3479	14751	17267	32343	22313	133	338-	17524	209	797-
200	30	10	5200	14843	13246	17785	1645	7		1033	8	2-
200	30	12	7096	14880	11806	12898	2695	58	9-	1411	60	15-
200	30	14	9009	14891	12037	12069	3491	201	20-	1567	180	27-

APPENDIX I

STOKES-STRUIK THIRD-APPROXIMATION COEFFICIENTS FOR AN ASSEMBLAGE OF WAVE CONDITIONS (CONTINUED)

d	H	T	L	η_1	η_2	η_0	V_1	~~V_2~~	V_3	σ_1	~~σ_2~~	σ_5
200	50	16	10884	14884	13199	.15109	4048	.0447	.00015	1590	.0331	.00018
200	30	18	12719	14857	14922	15619	4433	787	172	1348	549	180
200	30	20	14319	14798	17000	19160	4701	1204	535	1477	736	504
200	53	•8-	5533	17167	22256	46966	25707	197	568-	20190	309	1339-
200	35	10	5245	17275	17477	26840	1942	9	2-	1220	12	3-
200	55	12	7132	17520	15768	19865	5135	80	15-	1651	84	24-
200	55	14	9041	17527	16151	10741	4069	276	31-	1826	248	41-
200	55	16	10916	17509	17755	20338	4710	611	27	1850	480	32
200	55	18	12733	17280	20075	24586	5157	1072	279	1000	749	292
200	35	20	14339	17215	22884	29956	3463	1638	858	1717	1029	800
200	40	•8-	3569	19585	27546	64165	29022	280	897-	22794	440	2114-
200	40	10	5292	19692	22089	37970	2240	15	3-	1413	17	3-
200	40	12	7171	19746	20181	28697	3614	100	23-	1892	113	36-
200	40	14	9076	19750	20778	27310	4647	365	45-	2086	527	60-
200	40	16	10951	19721	22849	30036	3369	801	45	2108	629	52
200	40	18	12792	19669	25848	33652	5869	1400	424	2049	977	444
200	40	20	14605	19590	29475	43842	6215	2134	1290	1953	1341	1216
220	3	6-	1058	2494	.1055	.00650	5201	.0000	.00000	5446	.0000	.00000
220	5	8-	5284	2498	595	215	5920	1		5079	2	1-
220	3	10	5085	2501	599	94	208			131		
220	5	12	7090	2508	524	59	380			199		
220	5	14	9125	2504	514	50	519	5		255	3	
220	5	16	11111	2301	332	51	617	0		242	6	
220	3	18	13046	2504	371	38	688	15		240	11	
220	5	20	14937	2506	422	71	740	24	1	233	13	1
220	10	6-	1892	4950	5857	4629	10221			10703		
220	10	8-	5307	4984	2518	1632	7788	5	5-	6117	8	12-
220	10	10	5099	4990	1575	736	410			262		
220	10	12	7100	4995	1289	464	761	5		398	5	
220	10	14	9130	4996	1246	395	1056	13		463	12	
220	10	16	11118	3002	1320	407	1235	35		483	26	
220	10	18	15034	4996	1475	464	1374	61	2	479	42	2
220	10	20	14946	4977	1661	533	1470	96	9	462	60	9
220	13	6-	1939	7592	7912	13435	14999			15707		
220	15	8-	5340	7432	5019	3173	11572	12	17-	9009	20	41-
220	15	10	5121	7477	5409	2422	651			397		
220	15	12	7116	7487	2080	1546	1144	7		399	7	
228	15	14	9143	7487	2787	1320	1354	30	2-	697	27	2-
220	15	16	11130	7488	2968	1361	1849	73	1-	726	58	1-
220	13	18	13067	7403	3504	1533	2050	157	8	718	93	8
220	13	20	14960	7404	3749	1876	2210	218	32	694	137	30
220	20	•6-	1993	9809	12754	27125	19555			20478		2-
220	20	8-	3382	9901	8512	11354	15254	24	43-	11980	38	102-
220	20	10	3131	9948	6065	5334	030	1		534	1	
220	20	12	7138	9962	5053	3308	1327	13	1-	800	13	2-
220	20	14	9161	9960	4907	9001	2070	33	4-	929	48	6-
220	20	16	11147	9972	5245	3196	2463	131	2-	967	103	3-
220	20	10	15004	9964	5837	3652	2740	243	19	956	170	20
220	20	20	14979	9965	6630	4414	2942	307	77	924	243	73
220	25	•6-	2050	12228	18111	45262	23934		1-	25063		4-
220	23	8-	3429	12332	12623	20361	18031	41	90-	14790	64	211-
220	23	10	5187	12407	9231	10356	1075	2		676	2	
220	23	12	7164	12434	7787	6852	1915	21	3-	1003	22	4-
220	23	14	9183	12445	7610	5944	2390	84	8-	1162	76	11-
220	25	16	11168	12440	8125	6161	5075	205	4-	1208	161	5-
220	25	18	15106	12442	9069	7074	3422	381	38	1194	266	40
220	23	20	15004	12418	10264	8307	3666	604	151	1152	380	142
220	30	•6-	2107	14662	23825	67357	28174		3-	29304	2	10-
220	30	•8-	3481	14753	17214	32184	22311	65	165-	17523	102	390-
220	30	10	3228	14849	12902	17046	1307	3		821	3	
220	30	12	7196	14898	11033	11337	2307	30	5-	1208	32	7-
220	30	14	9210	14901	10829	10080	3108	123	14-	1393	110	19-
220	30	16	11193	14899	11592	10495	3685	297	6-	1447	233	8-
220	30	18	13133	14884	12921	12033	4093	549	67	1429	383	70
220	30	20	15033	14846	14613	14439	4381	867	262	1376	345	247
220	53	•8-	3555	17169	22180	46709	23704	97	281-	20188	152	662-
220	35	10	5272	17278	17008	25690	1547	4		972	5	
220	35	12	7231	17339	14735	17761	2700	42	8-	1414	44	12-
220	35	14	9240	17352	14538	15694	3627	169	23-	1628	132	31-
220	35	16	11222	17343	13609	16395	4293	406	9-	1686	319	11-
220	33	18	13163	17320	17410	18823	4764	748	109	1663	322	114
220	33	20	15068	17294	19741	22720	5102	1183	422	1603	743	390
220	40	•8-	3591	19583	27444	63787	29021	139	449-	22793	219	1057-
220	40	10	5320	19704	21503	36357	1795	5		1128	7	2-
220	40	12	7270	19772	18864	25664	3099	57	11-	1623	60	10-
220	40	14	9274	19795	18762	22935	4147	224	34-	1861	201	46-

d	H	T	L	η_1	η_2	η_3	V_1	~~V_2~~	V_3	σ_1	~~σ_2~~	σ_3
240	5	6-	1858	2494	.1056	.00650	5201	.0000	.00000	5447	.0000	.00000
240	5	8-	5287	2498	394	212	3919			3078		
240	5	10	5102	2499	392	91	164			103		
240	3	12	7167	2502	308	54	324			170		
240	5	14	9294	2498	286	43	461	2		207	2	
240	3	16	11388	2498	296	42	562	5		221	4	
240	5	18	13429	2501	325	46	635	11		222	7	
240	3	20	13422	2499	364	34	688	18		216	11	
240	10	6-	1892	4958	5856	4629	10221			10705		
240	10	8-	5508	4984	2315	1629	7787	2	2-	6116	4	5-
240	18	10	5116	4993	1552	719	329			207		
240	10	12	7177	4996	1224	426	649	2		340	2	
240	10	14	9302	4997	1140	540	922	8		414	7	
240	10	16	11595	4997	1182	553	1124	22		441	17	
240	10	18	13436	4997	1294	367	1269	45		445	50	
240	10	20	15429	4998	1434	433	1376	71	5	432	44	4
240	15	6-	1959	7392	7912	13433	14999			15707		
240	15	8-	3341	7452	5013	5162	11571	6	8-	9088	9	19-
240	13	10	5138	7479	3435	2360	498			513		
240	15	12	7193	7489	2753	1420	976	4		511	4	
240	13	14	9514	7489	2552	1138	1385	18	1-	621	17	2-
240	15	16	11406	7489	2647	1117	1685	49	1-	662	39	2-
240	15	18	13447	7494	2905	1236	1905	97	2	664	68	3
240	15	20	15442	7301	3269	1460	2064	160	16	648	100	15
240	20	•6-	1993	9810	12754	27125	19355			20478		
240	20	8-	3562	9901	0500	11320	15252	11	21-	11979	18	48-
240	20	10	5168	9949	5965	5389	672			422		
240	20	12	7214	9974	4805	3304	1305	7		683	7	
240	20	14	9331	9974	4503	2665	1045	35	3-	828	30	4-
240	20	16	11422	9975	4681	2624	2245	88	3-	882	69	4-
240	20	18	13463	9987	3146	2914	2337	173	6	886	121	6
240	20	20	13458	9975	3767	3422	2745	285	37	862	178	55
240	23	•6-	2030	12228	10111	45262	23954			25065		1-
240	25	8-	3430	12333	12605	20313	18030	20	43-	14789	31	102-
240	25	10	5204	12408	9076	10070	851			535		
240	25	12	7241	12437	7389	6289	1655	11	1-	856	11	2-
240	25	14	9353	12455	6976	5134	2308	52	5-	1036	47	7-
240	25	16	11441	12451	7262	5069	2005	138	7-	1101	100	8-
240	25	18	13483	12445	7965	5611	3162	269	12	1104	188	13
240	25	20	15480	12439	0943	6609	3422	442	73	1075	278	69
240	30	•6-	2107	14662	23025	67337	28174			29504		3-
240	30	•8-	3482	14734	17107	32103	22309	31	81-	17522	49	190-
240	30	10	5245	14854	12606	16309	1037	1		651	1	
240	30	12	7272	14901	10470	10383	1971	16	2-	1032	17	3-
240	30	14	9379	14917	9932	8713	2770	76	9-	1243	68	15-
240	50	16	11463	14908	10356	0652	3361	199	11-	1320	157	13-
240	30	10	13507	14907	11382	9506	3789	389	22	1322	271	23
240	30	20	15506	14904	12794	11313	4100	637	129	1280	400	121
240	35	•8-	5536	17170	22143	46584	25703	48	138-	20187	73	326-
240	35	10	3290	17288	16725	25005	1229	1		775	2	
240	35	12	7507	17352	13993	16318	2310	22	4-	1210	23	6-
240	33	14	9408	17371	13555	13569	3234	104	15-	1431	94	20-
240	35	16	11492	17570	13981	13520	3920	273	17-	1339	213	20-
240	33	18	13334	17354	13354	15020	4411	530	36	1540	370	37
240	35	20	13536	17329	17230	17690	4767	866	206	1497	344	194
240	40	•8-	3392	19587	27394	63602	29020	69	224-	22792	109	527-
240	40	10	5338	19712	21130	53349	1430	2		898	3	
240	40	12	7346	19790	17915	23581	2654	30	6-	1389	32	9-
240	40	14	9441	19824	17228	19854	3701	130	22-	1661	124	30-
240	40	16	11322	19803	18033	19840	4473	359	25-	1757	202	29-
240	40	18	13565	19791	19066	22106	5032	695	56	1737	403	58
240	40	20	15570	19747	22274	26015	5431	1130	311	1706	710	294
260	3	6-	1858	2495	.1036	00650	5202	.0000	.00000	5447	.0000	.00000
260	5	8-	3287	2498	394	212	3918			5077		
260	3	10-	3112	2499	308	90	3143	5	1-	1975	6	3-
260	5	12	7225	2500	296	50	276			144		
260	3	14	9437	2494	265	38	409	1		184	1	
260	3	16	11651	2497	268	33	312	4		201	3	
260	3	18	13774	2302	289	38	388	8		205	5	
260	5	20	15863	2500	321	43	643	13		202	8	
260	10	6-	1892	4960	3038	4632	10223			10706		
260	10	8-	3308	4984	2314	1627	7787	1	1-	6116	2	3-
260	10	10-	3126	4993	1537	708	6273	20	12-	3941	25	22-
260	10	12	7234	4997	1177	400	552			289		
260	10	14	9444	5000	1061	301	021	3		368	3	
260	10	16	11637	4999	1071	281	1026	13		403	12	

THE USE OF THE STOKES-STRUIK APPROXIMATION FOR WAVES OF FINITE HEIGHT

APPENDIX I

STOKES-STRUIK THIRD-APPROXIMATION COEFFICIENTS FOR AN ASSEMBLAGE OF WAVE CONDITIONS (CONTINUED)

d	H	T	L	η_1	η_2	η_3	V_1	V_2	V_3	o_1	a_2	o_3
260	15	8-	3541	7453	5011	.05159	11572	.0003	00004-	9088	.0004	00009-
260	15	10-	5149	7478	5397	2320	9365	45	41-	5884	57	76-
260	15	12	7250	7490	2628	1332	831	2		435	2	
260	15	14	9456	7490	2372	1007	1231	11		553	10	
260	15	16	11648	7494	2402	945	1538	33	1-	604	26	2-
260	15	18	13790	7491	2585	1007	1762	69		615	40	
260	15	20	15885	7490	2871	1156	1926	118	7	605	74	7
260	20	• 6-	1995	9810	12754	27125	19555			20478		
260	20	8-	3383	9901	8494	11517	15251	5	10-	11978	9	23-
260	20	10-	5179	9950	5904	5300	12415	83	97-	7801	104	184-
260	20	12	7272	9973	4617	3097	1111	4		582	4	
260	20	14	9475	9978	4188	2362	1643	20	2-	757	18	2-
260	20	16	11663	9978	4245	2219	2050	60	5-	805	47	4-
260	20	18	13805	9988	4585	2378	2350	124		820	86	
260	20	20	15898	9981	5088	2728	2567	210	18	806	132	17
260	25	• 6-	2050	12229	18112	45265	23934			25064		
260	25	8-	3431	12532	12594	20288	18827	9	21-	14787	15	49-
260	25	10-	5215	12414	8986	9918	15420	135	194-	9689	168	565-
260	25	12	7298	12443	7107	5903	1395	6		730	6	
260	25	14	9494	12461	6492	4553	2056	32	3-	923	29	5-
260	25	16	11681	12461	6592	4292	2562	94	6-	1006	74	7-
260	25	18	13823	12458	7112	4592	2931	193	1	1025	135	1
260	25	20	15917	12449	7894	5273	3201	328	55	1006	206	33
260	50	• 6-	2107	14662	23826	67359	28175			29505		
260	30	• 8-	5402	14754	17173	52062	22308	15	59-	17520	24	92-
260	50	10-	5256	14859	12555	16314	18364	199	541-	11558	250	642-
260	30	12	7330	14908	10069	9934	1682	8	1-	881	9	2-
260	30	14	9519	14923	9240	7724	2469	47	6-	1108	42	8-
260	50	16	11704	14940	9429	7359	5075	156	11-	1207	107	12-
260	30	18	13844	14909	10148	7827	3509	278	3	1225	194	3
260	30	20	15940	14912	11293	9024	3854	472	61	1205	297	57
260	35	• 8-	5557	17171	22126	46527	25703	23	68-	20187	37	161-
260	35	10-	5302	17292	16544	24572	21252	281	551-	15355	355	1059-
260	55	12	7365	17561	15456	15312	1973	12	2-	1033	12	3-
260	35	14	9548	17390	12445	12055	2885	65	9-	1295	58	13-
260	35	16	11729	17399	12717	11488	3585	186	17-	1408	146	19-
260	35	18	13870	17379	13729	12515	4092	381	5	1428	266	5
260	55	20	15967	17564	15256	14173	4465	643	98	1403	404	92
260	40	• 8-	3593	19589	27573	63521	29022	55	111-	22794	54	262-
260	40	10-	5350	19717	20894	54717	24089	581	840-	15136	479	1584-
260	40	12	7404	19804	17232	22135	2269	16	5-	1188	17	4-
260	40	14	9580	19837	16059	17616	3301	86	14-	1482	77	19-
260	40	16	11758	19845	16441	16876	4094	245	24-	1608	192	29-
260	40	18	13899	19826	17782	18151	4670	499	9	1630	548	9
260	40	20	15998	19799	19756	20891	5091	841	149	1599	528	140
280	5	6-	1858	2494	.1035	.00650	5200	.0000	.00000	5446	.0000	.00000
280	5	8-	3287	2501	595	215	3923			5081		
280	5	10-	5119	2498	585	89	3141	3		1975	4	2-
280	5	12	7268	2500	287	48	234			125		
280	5	14	9555	2504	251	54	566			164		
280	5	16	11843	2500	246	51	468	5		184	2	
280	5	18	14084	2499	260	31	545	6		190	4	
280	5	20	16272	2513	289	36	605	10		190	6	
280	10	6-	1892	4958	3857	4629	10221			10703		
280	10	8-	5309	4984	2314	1627	7787			6116		1-
280	10	10-	5133	4993	1526	700	6267	12	7-	3938	15	14-
280	10	12	7277	4997	1144	581	470			246		
280	10	14	9562	4998	998	273	730	3		328	3	
280	10	16	11849	4998	985	243	937	10		368	8	
280	10	18	14090	4998	1041	251	1090	22		381	16	
280	10	20	16278	5016	1150	284	1208	40		579	25	
280	15	6-	1959	7392	7911	13434	14998			15706		
280	15	8-	3341	7455	5011	5159	11573	1	2-	9090	2	4-
280	15	10-	5156	7480	5376	2297	9361	28	25-	5882	35	47-
280	15	12	7293	7484	2548	1267	706	1		370	1	
280	15	14	9574	7491	2234	912	1096	7		492	6	
280	15	16	11859	7492	2204	817	1405	23	1-	552	18	1-
280	15	18	14099	7500	2339	845	1656	50		571	55	
280	15	20	16288	7493	2563	944	1804	88	3	567	56	3
280	20	• 6-	1993	9810	12755	27127	19555			20478		
280	20	8-	5383	9901	8492	11311	15251	3	5-	11978	4	11-
280	20	10-	5186	9952	5867	5247	12410	51	61-	7797	64	114-
280	20	12	7315	9971	4481	2950	946	2		495	2	
280	20	14	9590	9983	3948	2142	1464	13	1-	657	11	1-
280	20	16	11873	9981	3900	1921	1873	41	2-	736	32	3-
280	20	18	14115	9981	4133	1984	2178	89	1-	760	62	1-
280	20	20	16301	9983	4541	2226	2404	157	8	755	99	7
280	25	• 6-	2050	12229	18113	45268	23955			25065		
280	25	8-	3431	12333	12591	20280	18828	5	10-	14788	7	24-
280	25	10-	5222	12411	.8921	.9803	15407	.0085	.00121-	9680	0104	.00227-
280	25	12	7341	12446	6903	5632	1188	3		622	3	
280	25	14	9611	12460	6112	4122	1831	20	2-	822	18	3-
280	25	16	11891	12459	6053	3713	2341	64	5-	919	50	6-
280	25	18	14130	12472	6435	3854	2723	140	3-	950	98	3-
280	25	20	16519	12460	7058	4313	3001	246	15	945	155	14
280	30	•6-	2107	14665	23827	67365	28176			29506		
280	30	• 8-	5483	14753	17166	32040	22307	7	19-	17520	12	45-
280	50	10-	5263	14857	12464	16127	18351	124	213-	11530	155	402-
280	50	12	7373	14912	9778	9474	1434	4		751	5	
280	30	14	9656	14934	8716	7010	2201	29	4-	988	26	5-
280	50	16	11912	14940	8662	6353	2810	93	8-	1103	73	10-
280	30	18	14150	14937	9198	6584	3262	202	4-	1139	141	5-
280	50	20	16340	14927	10102	7385	3595	554	27	1150	223	25
280	35	• 8-	3537	17171	22115	46490	25701	12	34-	20186	18	79-
280	55	10-	5309	17296	16431	24304	21245	176	347-	13348	221	654-
280	35	12	7409	17366	13067	14601	1683	6		881	6	1-
280	55	14	9664	17398	11729	10930	2572	40	6-	1154	36	8-
280	35	16	11937	17397	11683	9944	5276	127	15-	1287	100	15-
280	55	18	14175	17402	12453	10346	3803	276	7-	1327	193	7-
280	55	20	16564	17387	13660	11615	4188	483	44	1316	504	41
280	40	• 8-	3593	19587	27355	65458	29019	17	55-	22791	27	150-
280	40	10-	5358	19720	20744	34517	24079	240	531-	15129	301	1001-
280	40	12	7448	19811	16732	21100	1937	8	1-	1014	9	2-
280	40	14	9696	19852	15128	15987	2945	54	8-	1322	48	11-
280	40	16	11965	19859	15131	14645	3746	168	19-	1471	132	23-
280	40	18	14200	19845	16097	15237	4339	362	9-	1515	252	9-
280	40	20	16392	19839	17719	17160	4779	632	67	1501	597	63
500	5	6-	1858	2492	.1034	.00649	5197	.0000	00000	5443	.0000	.00000
300	5	8-	3287	2499	594	212	3920			5078		
300	5	10-	5123	2498	384	88	3140	2		1973	2	1-
500	5	12	7299	2500	281	46	199			104		
500	5	14	9651	2500	258	52	325			146		
300	5	16	12028	2511	231	27	430	2		169	1	
300	5	18	14365	2502	238	27	507	4		177	3	
300	5	20	16645	2502	258	29	565	7		178	5	
500	10	6-	1892	4958	3857	4629	10221			10703		
500	10	8-	5509	4985	2314	1626	7787			6116		
500	10	10-	5137	4994	1521	696	6265	7	5-	5937	9	9-
300	10	12	7309	4996	1119	368	399			209		
500	10	14	9658	4999	951	252	650	2		292	2	
300	10	16	12033	4998	913	215	856	7		336	5	
300	10	18	14369	4984	945	212	1010	16		353	11	
300	10	20	16651	5007	1034	255	1131	30		355	19	
300	15	6-	1939	7391	7910	13429	14997			15704		
300	15	8-	3342	7454	5009	5156	11572			9088		2-
500	15	10-	5160	7474	5358	2277	9351	17	16-	5875	22	29-
300	15	12	7325	7485	2494	1224	600			314		
300	15	14	9670	7490	2126	841	975	4		438	4	
300	15	16	12045	7492	2048	722	1285	16		504	12	
300	15	18	14378	7498	2134	721	1520	37		530	26	
300	15	20	16660	7492	2312	786	1693	67	1	532	42	1
300	20	• 6-	1995	9811	12757	27152	19557			20480		
300	20	8-	3383	9901	8491	11309	15251	1	2-	11978	2	5-
500	20	10-	5190	9951	5841	5210	12403	32	38-	7793	40	71-
300	20	12	7346	9971	4384	2848	803			421		
300	20	14	9687	9983	3759	1976	1303	8		585	7	
300	20	16	12057	9992	3632	1703	1715	28	2-	673	22	2-
300	20	18	14390	9984	3776	1697	2024	65	2-	707	46	2-
300	20	20	16672	9982	4097	1854	2256	119	3	709	75	3
300	25	• 6-	2050	12228	18111	45261	25934			25063		
500	25	8-	3451	12353	12590	20275	18828	2	5-	14788	3	11-
500	25	10-	5226	12412	8885	9740	15403	51	75-	9678	64	142-
300	25	12	7375	12448	6755	5438	1010	2		529	2	
300	25	14	9707	12463	5822	3803	1631	12	1-	732	11	2-
500	25	16	12074	12476	5640	3294	2145	44	4-	842	35	4-
300	25	18	14406	12477	5881	3297	2551	102	4-	883	71	4-
300	25	20	16688	12463	6372	3597	2816	186	6	885	117	5
300	30	• 6-	2107	14662	23825	67556	28174			29504		
500	50	• 8-	5483	14755	17167	32042	22310	4	9-	17522	6	22-
300	30	10-	5268	14858	12411	16017	18345	77	133-	11527	97	251-
300	30	12	7405	14921	9576	9159	1221	2		639	2	
300	30	14	9732	14936	8500	6469	1960	18	2-	880	16	5-
500	30	16	12095	14946	8057	5621	2571	64	6-	1010	50	7-
300	30	18	14425	14947	8411	5658	5033	148	6-	1059	103	7-
300	30	20	16708	14943	9137	6175	3377	269	10	1061	169	9
300	35	• 8-	3537	17171	22110	46475	25701	6	16-	20186	9	39-
500	35	10-	5314	17294	16553	24121	21235	110	218-	13542	138	410-
300	35	12	7441	17372	12788	14100	1434	3		751	3	

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APPENDIX I

STOKES-STRUIK THIRD-APPROXIMATION COEFFICIENTS FOR AN ASSEMBLAGE OF WAVE CONDITIONS (CONTINUED)

d	H	T	L	η_1	η_2	η_3	V_1	~~V_2~~	V_3	a_1	~~a_2~~	a_3
500	35	14	9760	17404	11174	.10092	2292	0025	.00003-	1029	.0023	.00004-
300	33	16	12119	17417	10882	8817	3000	88	10-	1178	69	11-
500	35	18	14447	17416	11376	8864	3336	202	10-	1234	141	10-
500	53	20	16730	17406	12339	9714	3935	366	16	1236	230	13
300	40	10-	5362	19718	20643	34052	24069	130	335-	13123	189	631-
500	40	12	7480	19818	16371	20370	1632	4		865	5	
500	40	14	9791	19871	14430	14787	2627	33	3-	1179	30	7-
500	40	16	12145	19868	14077	12962	3428	116	14-	1346	91	17-
500	40	18	14473	19868	14741	13071	4037	263	14-	1409	185	15-
500	40	20	16736	19860	16034	14334	4491	479	23	1411	301	24
520	5	6-	1858	2492	.1034	00648	5197	0000	.00000	5442	.0000	.00000
520	5	8-	3287	2498	393	212	3919			3078		
320	5	10-	5126	2500	383	88	3141	1		1974	1	
520	5	12	7325	2500	277	43	169			88		
320	5	14	9730	2495	228	29	288			129		
520	5	16	12188	2511	217	23	393	1		134		
520	5	18	14614	2510	221	24	473	3		165	2	
320	5	20	16988	2499	233	23	330	6		167	4	
520	10	6-	1892	4938	3837	4629	10221			10703		
320	10	8-	3309	4984	2313	1626	7787			6116		
520	10	10-	5140	4994	1317	693	6264	3	3-	3936	6	3-
520	10	12	7332	4997	1101	339	338			177		
320	10	14	9757	5007	916	237	379	1		260	1	
320	10	16	12194	5003	860	194	784	3		308	4	
320	10	18	14619	5000	877	187	942	12		329	8	
320	10	20	16995	4998	958	198	1061	23		333	14	
520	15	6-	1959	7592	7912	15435	14999			13707		
520	13	8-	5342	7453	5007	5134	11570			9087		
320	13	10-	5162	7479	3554	2272	9334	11	10-	3878	13	18-
520	15	12	7348	7485	2453	1191	509			266		
520	13	14	9749	7495	2043	789	868	3		389	2	
320	15	16	12205	7501	1926	631	1176	11		462	9	
520	13	18	14628	7498	1968	627	1415	27		493	19	
320	13	20	17001	7494	2108	668	1591	31		500	32	
320	20	• 6-	1993	9809	12754	27125	19555			20478		
320	20	8-	3383	9902	8491	11310	15232		1-	11979		2-
320	20	10-	3192	9951	5826	3188	12400	20	23-	7791	25	44-
320	20	12	7370	9976	4519	2780	682			357		
320	20	14	9765	9982	3611	1830	1159	5		520	4	
520	20	16	12217	9991	3408	1531	1568	19	1-	616	15	2-
320	20	18	14640	9989	3486	1479	1883	48	2-	657	34	2-
320	20	20	17013	9985	3735	1575	2120	91		666	57	
520	25	• 6-	2050	12228	18111	45261	25934			25063		
320	23	8-	3431	12333	12589	20274	18828	1	2-	14788	2	5-
320	23	10-	5229	12412	8862	9699	15399	32	47-	9676	40	88-
320	25	12	7397	12447	6646	5297	858			449		
520	23	14	9786	12465	5596	3566	1451	8		651	7	
320	25	16	12233	12473	5291	2960	1960	31	2-	770	24	3-
320	25	18	14655	12481	5427	2872	2354	75	4-	822	53	4-
320	23	20	17028	12484	3826	3069	2631	143		833	90	
520	30	• 6-	2107	14662	23825	67356	28174			29504		
320	50	• 8-	5483	14754	17163	32032	22308	2	5-	17521	3	11-
320	30	10-	5271	14861	12382	15955	18345	48	83-	11526	60	157-
320	50	12	7429	14916	9416	8915	1037	1		543	1	
520	30	14	9810	14942	7980	6066	1745	11	1-	783	10	2-
320	30	16	12253	14953	7570	5063	2333	44	4-	924	35	5-
320	30	18	14673	14952	7765	4913	2822	109	6-	985	76	7-
320	30	20	17046	14949	8335	5250	3175	205	2	998	129	2
320	35	• 8-	3537	17171	22108	46468	25701	3	8-	20186	4	19-
520	35	10-	5316	17295	16309	24015	21232	69	136-	13340	86	257-
320	35	12	7465	17577	12586	13744	1220	2		639	2	
320	35	14	9838	17408	10741	9459	2041	16	2-	916	14	3-
320	35	16	12277	17427	10228	7946	2747	61	7-	1079	48	8-
320	35	18	14695	17432	10514	7738	3293	149	10-	1149	104	10-
320	55	20	17067	17419	11284	8269	3701	280	3	1163	176	3
320	40	• 8-	3593	19587	27346	63424	29019	4	14-	22791	7	32-
320	40	10-	5365	19723	20590	33913	24069	94	211-	15123	119	397-
320	40	12	7504	19822	16109	19847	1407	2		737	2	
320	40	14	9870	19870	13861	13846	2340	21	3-	1050	19	4-
320	40	16	12303	19877	13227	11675	3139	80	10-	1233	63	12-
320	40	18	14719	19890	13632	11419	3760	195	15-	1312	136	15-
320	40	20	17091	19876	14643	12223	4224	367	5	1327	230	5
340	5	6-	1858	2494	.1036	.00650	5201	0000	.00000	5446	0000	00000
340	5	8-	3287	2498	593	212	3919			3078		
[illegible]	5	10-	5127	2495	381	87	3135			1969		

d	H	T	L	η	η	η	V_1	~~V_2~~	V_8	a_1	~~a_2~~	a_3
340	3	18	14840	2497	.0204	.00021	.438	.0002	.00000	.153	.0002	.00000
340	5	20	17302	2487	214	21	496	4		156	3	
340	10	6-	1892	4958	3856	4629	10821			10703		
340	10	8-	3309	4984	2313	1626	7786			6113		
340	10	10-	3141	4993	1314	691	6262	3	2-	3934	4	3-
340	10	12	7349	4997	1089	332	286			130		
340	10	14	9801	4998	884	224	514			231		
340	10	16	12333	3003	813	177	717	3		282	3	
340	10	18	14843	4993	813	164	876	9		306	6	
540	10	20	17307	4982	837	169	995	17		313	11	
540	13	6-	1939	7392	7912	13433	14999			13707		
340	13	8-	3342	7432	5007	3153	11370			9087		
340	13	10-	3164	7480	3349	2267	9354	7	6-	5877	8	11-
540	13	12	7363	7490	2429	1173	432			226		
540	13	14	9813	7493	1980	749	771	2		346	2	
340	13	16	12342	7304	1826	593	1076	8		425	6	
340	13	18	14833	7308	1836	337	1517	20		460	14	
340	13	20	17313	7496	1937	376	1497	39		470	23	
340	20	• 6-	1995	9810	12734	27123	19555			20478		
340	20	8-	5383	9901	8490	11306	15251			11978		1-
340	20	10-	3194	9951	5817	3175	12599	12	14-	7790	15	27-
340	20	12	7387	9973	4268	2727	579			303		
340	20	14	9829	9983	3496	1736	1030	5		462	3	
540	20	16	12335	9987	3224	1397	1434	13		565	11	1-
340	20	18	14863	10001	3251	1312	1753	36	2-	613	25	2-
340	20	20	17326	9992	5458	1362	1996	70		627	44	
340	23	• 6-	2030	12228	18111	43262	25934			25063		
340	23	8-	3431	12353	12389	20273	18828		1-	14788		5-
340	23	10-	3231	12411	8846	9671	13396	20	29-	9674	25	54-
340	25	12	7414	12444	6366	3193	728			581		
340	23	14	9830	12467	5419	3384	1290	5		579	4	
340	25	16	12371	12478	5014	2707	1794	21	2-	705	17	2-
340	23	18	14879	12473	5046	2336	2190	56	5-	765	59	5-
340	23	20	17340	12479	5351	2645	2493	110	1-	783	69	1-
340	30	• 6-	2107	14662	23825	67356	28174			29504		
340	30	• 8-	3483	14734	17162	32029	22308		2-	17320	1	5-
340	30	10-	3272	14860	12358	13906	18340	30	52-	11523	37	97-
340	30	12	7446	14918	9307	8749	881			461		
340	30	14	9874	14943	7728	5737	1353	7		697	6	
340	30	16	12391	14933	7170	4626	2154	31	3-	846	24	3-
340	30	18	14897	14958	7231	4350	2628	80	5-	917	56	6-
340	30	20	17337	14957	7670	4538	2989	158	2-	939	99	2-
340	35	• 8-	3337	17171	22107	46465	25701	1	4-	20186	2	9-
340	35	10-	5318	17296	16281	23949	21230	43	83-	13339	54	161-
340	35	12	7482	17378	12437	13483	1037			543		
340	35	14	9902	17413	10402	8977	1817	10	1-	815	9	1-
340	35	16	12414	17430	9689	7261	2314	42	5-	987	35	6-
540	35	18	14917	17427	9781	6839	3064	110	8-	1070	77	9-
340	33	20	17377	17430	10388	7152	3485	216	3-	1093	135	3-
340	40	• 8-	3393	19388	27345	63422	29019	2	7-	22792	3	16-
340	40	10-	5367	19724	20553	33815	24067	59	152-	15122	74	249-
340	40	12	7322	19829	15924	19482	1197	1		627	1	
340	40	14	9934	19877	13425	13143	2083	13	2-	935	12	2-
340	40	16	12440	19895	12330	10693	2876	56	7-	1129	44	8-
340	40	18	14941	19900	12702	10118	3502	144	13-	1223	101	13-
340	40	20	17399	19897	13494	10587	3979	282	4-	1250	177	4-
360	5	6-	1858	2494	.1035	.00650	5200	.0000	.00000	5446	.0000	.00000
360	5	8-	3287	2498	593	212	3918			3077		
360	5	10-	5128	2499	382	88	3139			1972		
360	5	12	7352	2497	271	44	121			63		
360	5	14	9846	2505	217	27	228			102		
360	5	16	12447	2509	195	21	329			129		
360	5	18	13043	2489	190	18	406	2		142	1	
360	5	20	17591	2301	200	19	470	3		148	2	
360	10	6-	1892	4959	3857	4630	10222			10704		
360	10	8-	3309	4984	2313	1626	7787			6116		
360	10	10-	5142	4994	1513	690	6262	2	1-	3934	2	2-
360	10	12	7362	4997	1079	348	243			127		
360	10	14	9853	4997	861	214	456			205		
360	10	16	12452	4991	772	163	654	2		257	2	
360	10	18	13047	4999	765	148	816	7		285	5	
360	10	20	17596	5000	799	150	940	14		295	8	
360	15	6-	1939	7392	7912	13435	14999			15707		
360	15	8-	3342	7453	5008	5154	11571			9088		
360	15	10-	5165	7478	3344	2263	9351	4	4-	5876	5	7-
360	15	12	7378	7492	2410	1158	366			191		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1		308		

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APPENDIX I

STOKES-STRUIK THIRD-APPROXIMATION COEFFICIENTS FOR AN ASSEMBLAGE OF WAVE CONDITIONS (CONTINUED)

d	H	T	L	η_1	η_2	η_3	V_1	V_2	V_3	a_1	a_2	a_3
360	15	20	17603	7511	1802	.00508	1413	.0031	00000	.444	0019	.00000
360	20	• 6-	1993	9810	12754	27125	19555			20478		
360	20	8-	3383	9901	8489	11306	15251			11978		
360	20	10-	5195	9952	5812	5168	12398	7	9-	7790	9	17-
360	20	12	7399	9974	4231	2690	490			257		
360	20	14	9881	9984	3407	1683	915	2		411	2	
360	20	16	12475	9992	3079	1294	1313	9		515	7	
360	20	18	15066	9992	3043	1174	1633	26	1-	570	18	1-
360	20	20	17614	9990	3183	1192	1879	54	1-	590	34	1-
360	25	• 6-	2050	12228	18111	45263	23934			25063		
360	25	8-	3431	12333	12587	20270	18827			14787		1-
360	25	10-	5232	12414	8841	9662	15398	12	18-	9675	15	34-
360	25	12	7427	12448	6514	5129	617			323		
360	25	14	9902	12471	5281	3246	1147	3		515	3	
360	25	16	12491	12478	4784	2505	1641	15	1-	645	12	1-
360	25	18	15081	12478	4735	2277	2041	41	3-	712	29	3-
360	25	20	17627	12479	4957	2316	2348	85	2-	738	53	2-
360	30	• 6-	2107	14662	23825	67357	28175			29504		
360	30	• 8-	3483	14754	17161	32026	22307		1-	17520		3-
360	30	10-	5273	14862	12348	15886	18341	19	32-	11524	23	61-
360	30	-12	7459	14923	9233	8637	748			391		
360	30	14	9926	14947	7530	5520	1380	4		619	4	
360	30	16	12510	14959	6845	4284	1971	21	2-	774	17	2-
360	30	18	15098	14953	6779	3899	2447	60	4-	854	42	5-
360	30	20	17643	14962	7110	3977	2816	122	4-	885	77	3-
360	35	• 8-	3537	17171	22108	46466	25702		2-	20186	1	5-
360	35	10-	5319	17298	16265	23911	21229	27	53-	13339	34	100-
360	35	12	7495	17378	12329	13296	881			461		
360	35	14	9954	17418	10138	8610	1616	6		725	5	
360	35	16	12533	17439	9255	6730	2302	29	3-	904	23	4-
360	35	18	15117	17434	9182	6144	2856	81	7-	997	57	7-
360	35	20	17662	17439	9633	6272	3284	167	6-	1032	105	5-
360	40	• 8-	3593	19589	27347	63427	29021	1	3-	22793	2	8-
360	40	10-	5368	19725	20530	33754	24066	37	83-	15121	47	156-
360	40	12	7535	19829	15783	19206	1017			533		
360	40	14	9986	19882	13082	12602	1854	8		832	7	1-
360	40	16	12559	19905	11987	9910	2634	39	5-	1034	30	6-
360	40	18	15140	19914	11933	9098	3265	107	10-	1140	75	11-
360	40	20	17683	19910	12519	9290	3751	219	8-	1178	137	8-
380	5	6-	1858	2494	1035	00650	5200	0000	00000	5446	0000	00000
380	5	8-	3287	2497	593	212	3916			3076		
380	5	10-	5129	2499	382	88	3139			1972		
380	5	12-	7361	2500	270	43	2621	3		1372	3	
380	5	14	9888	2501	212	26	202			91		
380	5	16	12550	2507	187	19	300			118		
380	5	18	15224	2501	181	17	380	1		133		
380	5	20	17856	2510	188	17	445	3		140	2	
380	10	6-	1892	4958	3856	4629	10221			10703		
380	10	8-	3309	4983	2312	1625	7784			6114		
380	10	10-	5143	4993	1512	689	6261	1		3934	1	1-
380	10	12-	7370	5000	1075	345	5239	10	4-	2743	11	7-
380	10	14	9895	5006	846	208	405			182		
380	10	16	12556	4999	744	153	599	2		235	1	
380	10	18	15229	5005	724	135	761	5		266	3	
380	10	20	17861	5000	745	133	886	11		278	7	
380	15	6-	1939	7391	7910	13432	14997			15705		
380	15	8-	3342	7454	5009	5156	11572			9089		
380	15	10-	5165	7482	3346	2264	9356	2	2-	5879	3	4-
380	15	12-	7387	7496	2398	1148	7841	24	15-	4106	25	23-
380	15	14	9907	7497	1890	695	608			273		
380	15	16	12565	7494	1669	514	899	4		353	3	
380	15	18	15237	7493	1620	451	1140	11		398	8	
380	15	20	17868	7488	1670	446	1327	24		417	15	
380	20	• 6-	1993	9810	12755	27126	19555			20478		
380	20	10-	5196	9952	5808	5163	12398	5	5-	7790	6	18-
380	20	12-	7408	9975	4206	2664	10415	42	35-	5453	44	55-
380	20	14	9923	9993	3342	1632	813	1		365	1	
380	20	16	12578	9996	2960	1213	1201	6		472	5	
380	20	18	15247	9987	2872	1065	1521	20	1-	531	14	1-
380	20	20	17878	9996	2972	1059	1772	42	1-	557	26	1-
380	25	• 6-	2050	12229	18112	45265	23934			25064		
380	25	8-	3431	12331	12583	20261	18824			14785		
380	25	10-	5232	12412	8831	9646	15394	8	11-	9672	9	21-
380	25	12-	7436	12454	6479	5085	12974	67	69-	6793	70	109-
380	25	14	9944	12470	5171	3137	1018	2		457	2	
380	25	16	12594	12487	4602	2349	1503	10		590	8	
380	25	18	15261	12482	4474	2070	1902	31	2-	664	21	
380	25	20	17891	12475	4621	2052	2212	66	2-	695	41	
380	30	• 6-	2107	14662	23826	67360	28175			29505		
380	30	• 8-	3483	14754	17160	32023	22307	.0000	.00000	17520	.0000	00001-
380	30	10-	5274	14860	12336	15862	18337	12	20-	11522	14	38-
380	30	12-	7468	14926	9179	8556	15507	99	121-	8119	103	190-
380	30	14	9968	14949	7375	5336	1226	3		550	2	
380	30	16	12613	14960	6576	4010	1803	15	1-	708	12	2-
380	30	18	15278	14965	6413	3551	2282	44	3-	797	31	4-
380	30	20	17906	14971	6640	3534	2656	95	4-	834	60	4-
380	35	• 8-	3537	17173	22110	464¯4	25704			20188		2-
380	35	10-	5320	17299	16256	23890	21230	17	33-	13339	21	63-
380	35	12-	7504	17379	12252	13163	17999	137	194-	9424	144	305-
380	35	14	9996	17421	9929	8325	1436	4		644	3	
380	35	16	12636	17438	8889	6297	2107	20	2-	827	16	3-
380	35	18	15297	17449	8689	5596	2663	61	5-	930	42	6-
380	35	20	17924	17446	8994	5570	3097	130	6-	973	82	6-
380	40	• 8-	3593	19587	27343	63413	29018		2-	22791		4-
380	40	10-	5369	19725	20515	33715	24065	23	52-	15120	29	98-
380	40	12-	7544	19829	15682	19009	20467	183	294-	10716	192	461-
380	40	14	10028	19886	12812	12184	1648	5		740	5	
380	40	16	12661	19911	11521	9283	2411	27	3-	947	21	4-
380	40	18	15319	19920	11280	8274	3044	80	8-	1062	56	8-
380	40	20	17945	19926	11699	8261	3538	170	9-	1112	107	8-
400	5	6-	1858	2494	1035	00650	5200	0000	00000	5445	.0000	.00000
400	5	8-	3287	2497	593	212	3917			3076		
400	5	10-	5129	2501	382	88	3141			1973		
400	5	12-	7367	2501	269	43	2621	2		1372	2	
400	5	14	9921	2506	209	26	180			81		
400	5	16	12639	2493	179	18	273			107		
400	5	18	15387	2500	172	15	354			124		
400	5	20	18100	2506	176	15	419	2		132	1	
400	10	6-	1892	4958	3857	4629	10221			10703		
400	10	8-	3309	4984	2313	1626	7787			6116		
400	10	10-	5143	4993	1511	689	6261			3934		
400	10	12-	7377	4999	1069	342	5234	7	3-	2741	8	5-
400	10	14	9928	5001	830	202	359			161		
400	10	16	12644	5001	719	145	548	1		215		
400	10	18	15391	5001	687	123	709	4		247	3	
400	10	20	18104	4999	699	119	835	8		262	5	
400	15	6-	1939	7392	7911	13434	14998			15706		
400	15	8-	3342	7455	5010	5157	11573			9090		
400	15	10-	5166	7478	3341	2259	9350	2	1-	5875	2	3-
400	15	12-	7393	7489	2383	1138	7832	17	11-	4101	18	17-
400	15	14	9940	7494	1858	675	539			242		
400	15	16	12654	7495	1613	486	822	3		323	2	
400	15	18	15399	7509	1546	417	1065	8		372	6	
400	15	20	18111	7510	1577	404	1255	19		394	12	
400	20	• 6-	1993	9810	12755	27127	19556			20479		
400	20	8-	3383	9903	8492	11311	15253			11980		
400	20	10-	5196	9955	5810	5165	12401	3	3-	7792	4	6-
400	20	12-	7415	9980	4192	2650	10417	30	25-	5454	32	40-
400	20	14	9957	9984	3281	1584	721			323		
400	20	16	12666	9991	2857	1145	1098	4		431	4	
400	20	18	15409	9992	2732	979	1418	15		495	10	
400	20	20	18120	9991	2787	948	1671	33	1-	525	21	1-
400	25	• 6-	2050	12229	18113	45269	23935			25065		
400	25	8-	3431	12333	12588	20270	18828			14787		
400	25	10-	5233	12412	8829	9641	15394	5	7-	9673	6	13-
400	25	12-	7442	12454	6450	5049	12968	48	50-	6790	50	78-
400	25	14	9977	12470	5085	3053	904	1		406	1	
400	25	16	12682	12478	4440	2216	1373	7		539	6	
400	25	18	15423	12484	4254	1902	1773	23	1-	619	16	2-
400	25	20	18133	12481	4342	1844	2088	51	2-	656	32	2-
400	30	• 6-	2107	14663	23827	67366	28176			29506		
400	30	• 8-	3483	14753	17160	32023	22306			17519		
400	30	10-	5275	14860	12331	15852	18337	7	12-	11521	9	23-
400	30	12-	7474	14922	9132	8487	15496	71	87-	8114	74	137-
400	30	14	10002	14950	7252	5194	1088	2		488	1	
400	30	16	12702	14961	6354	3791	1649	10		648	8	1-
400	30	18	15439	14969	6099	3264	2127	33	3-	743	23	3-
400	30	20	18148	14968	6231	3169	2505	74	4-	787	47	3-
400	35	• 8-	3537	17171	22106	46461	25701			20186		1-
400	35	10-	5321	17300	16250	23875	21230	10	21-	13339	13	39-
400	35	12-	7511	17380	12198	13069	17993	98	140-	9421	103	220-
400	35	14	10030	17423	9764	8102	1275	2		572	2	
400	35	16	12724	17443	8593	5956	1927	14	1-	757	11	2-
400	35	18	15458	17450	8261	5142	2483	45	4-	867	32	4-
400	35	20	18165	17451	8449	5003	2922	101	6-	918	64	5-
400	40	• 8-	3593	19587	27343	63412	29018			22791		2-
400	40	10-	5370	19724	20504	33686	24063	15	33-	15119	18	61-
400	40	12-	7551	19830	15610	18870	20460	132	212-	10713	138	333-

APPENDIX I

STOKES-STRUIK THIRD-APPROXIMATION COEFFICIENTS FOR AN ASSEMBLAGE OF WAVE CONDITIONS (CONTINUED)

d	H	T	L	η_1	η_2	η_3	V_1	~~V_2~~	V_5	O_1	~~a_2~~	a_3
400	40	14	10062	19894	12605	.11867	1464	.0003	00000	.657	.0003	.00000
400	40	16	12749	19911	11131	8773	2206	19	2-	866	15	2-
400	40	18	15480	19926	10730	7608	2838	60	6-	991	42	6-
	40	20	18185	19929	10988	7417	3338	133	9-	1049	83	8-
4 0	5	6-	1858	2493	.1035	.00649	5199	.0000	.00000	5445	.0000	00000
420	5	8-	3287	2498	593	212	5918			3078		
420	5	10-	5129	2497	381	87	5136			1970		
420	5	12-	7372	2500	268	43	2619	1		1371	1	
420	5	14	9948	2505	206	25	159			71		
420	5	16	12715	2506	176	17	251			99		
420	5	18	15532	2511	166	15	352			116		
420	5	20	18325	2513	167	14	596	2		124	1	
420	10	6-	1892	4958	3857	4629	10221			10703		
420	10	8-	3309	4985	2313	1626	7787			6116		
420	10	10-	5143	4994	1511	689	6261			3934		
420	10	12-	7381	4997	1065	340	5231	5	2-	2739	6	3-
420	10	14	9955	4990	816	196	318			143		
420	10	16	12720	4998	698	138	501			197		
420	10	18	15536	5001	656	114	661	3		231	2	
420	10	20	18527	4996	659	108	788	6		247	4	
420	15	6-	1959	7391	7910	13431	14997			15705		
420	15	8-	3342	7454	5009	5156	11572			9089		
420	15	10-	5166	7475	3338	2295	9346			5872	1	2-
420	15	12-	7398	7487	2374	1131	7827	12	8-	4098	13	12-
420	15	14	9967	7489	1031	660	478			214		
420	15	16	12729	7493	1565	462	751	2		295	1	
420	15	18	15544	7498	1473	385	991	6		346	4	
420	15	20	18334	7499	1484	364	1105	14		572	9	
420	20	• 6-	1993	9810	12756	27130	19556			20479		
420	20	8-	3383	9901	0489	11306	15251			11978		
420	20	10-	5196	9951	5804	5157	12397	2	2-	7709	2	4-
420	20	12-	7420	9973	4172	2631	10406	22	18-	5449	23	28-
420	20	14	9983	9991	3241	1553	639			287		
420	20	16	12742	9992	2775	1091	1003	3		394	2	
420	20	18	15554	9999	2615	910	1322	11		462	8	
420	20	20	18343	9991	2631	860	1576	26		495	16	
420	25	• 6-	2050	12228	18111	45261	23934			25063		
420	25	8-	3431	12333	12588	20271	18828			14787		
420	25	10-	5233	12413	8827	9639	15395	3	4-	9675	4	8-
420	25	12-	7447	12452	6427	5020	12962	34	36-	6787	36	56-
420	25	14	10004	12472	5018	2989	801			360		
420	25	16	12758	12481	4314	2114	1256	5		495	4	
420	25	18	15568	12494	4073	1769	1653	17	1-	577	12	1-
420	25	20	18355	12483	4099	1672	1970	40	2-	619	25	2-
420	30	• 6-	2107	14662	23825	67356	28174			29504		
420	30	• 8-	3483	14755	17162	32030	22308			17521		
428	30	10-	5275	14860	12528	15845	18337	4	8-	11521	6	15-
420	50	12-	7479	14921	9101	8441	15490	51	62-	8110	53	98-
420	30	14	10028	14945	7151	5078	965	1		433		
420	30	16	12777	14965	6174	3617	1509	7		592	6	
420	30	18	15584	14971	5832	3029	1983	25	2-	692	17	2-
420	30	20	18369	14972	5885	2875	2364	58	3-	743	37	3-
420	35	• 8-	3557	17171	22106	46461	25701			20186		
420	35	10-	5321	17297	16241	23856	21227	6	13-	13337	8	24-
420	55	12-	7516	17382	12160	13004	17990	71	101-	9419	74	158-
420	35	14	10057	17424	9633	7929	1131	1		508	1	
420	35	16	12800	17456	8357	5690	1764	10		693	8	1-
420	35	18	15602	17464	7909	4781	2316	34	5-	808	24	3-
420	35	20	18386	17456	7981	4539	2758	79	5-	866	50	5-
420	40	• 8-	3593	19587	27343	63412	29018			22791		
420	40	10-	5370	19721	20493	33658	24059	9	20-	15117	11	39-
420	40	12-	7556	19832	15559	18771	20455	95	153-	10710	99	240-
420	40	14	10088	19891	12431	11604	1300	2		583	2	
420	40	16	12825	19920	10818	8373	2018	13	1-	793	10	2-
420	40	18	15624	19934	10265	7066	2647	45	5-	924	31	5-
420	40	20	18405	19919	10363	6714	3149	104	7-	989	65	7-
440	5	6-	1858	2494	.1035	00650	5200	.0000	.00000	5446	.0000	.00000
440	5	8-	3287	2498	594	212	5919			3078		
440	5	10-	5129	2500	382	88	5140			1973		
440	5	12-	7375	2501	267	43	2620			1372		
440	5	14	9969	2498	203	24	141			63		
440	5	16	12779	2506	171	17	229			90		
440	5	18	15661	2502	158	13	308			107		
440	5	20	18527	2519	159	13	375	1		118		

d	H	T	L	η_1	η_2	η_3	V_1	~~V_2~~	V_3	O_1	~~a_2~~	a_3
440	10	14	9976	4998	.0810	.00194	.282	0000	.00000	126	.0000	.00000
440	10	16	12785	5002	602	133	458			180		
440	10	18	15666	5004	631	107	616	2		215	1	
440	10	20	18531	4999	626	99	744	5		234	3	
440	15	6-	1939	7392	7912	13435	14999			15707		
440	15	8-	3342	7452	5007	5153	11570			9087		
440	15	10-	5166	7479	3340	2258	9550			5075		
440	15	12-	7401	7488	2370	1127	7826	9	5-	4098	9	8-
440	15	14	9900	7485	1810	648	425			190		
440	15	16	12794	7495	1528	444	687	1		270		
440	15	18	15673	7497	1415	360	925	5		522	3	
440	15	20	18538	7485	1403	531	1114	11		350	7	
440	20	• 6-	1993	9810	12754	27125	19555			20478		
440	20	8-	3383	9901	8490	11307	15251			11978		
440	20	10-	5196	9951	5803	5156	12396	1	1-	7789	1	2-
440	20	12-	7423	9975	4165	2623	10406	15	13-	5449	16	20-
440	20	14	10004	9985	3203	1524	566			254		
440	20	16	12807	9990	2706	1047	917	2		360	2	
440	20	18	15683	9992	2509	850	1232	8		430	6	
440	20	20	18547	9993	2497	787	1488	20		468	13	
440	25	• 6-	2050	12228	10111	45261	23934			25063		
440	25	8-	3431	12333	12588	20271	18828			14787		
440	25	10-	5233	12413	8826	9637	15395	2	3-	9673	2	5-
440	25	12-	7450	12450	6411	5000	12958	25	25-	6785	26	40-
440	25	14	10025	12471	4965	2938	710			319		
440	25	16	12822	12481	4207	2029	1147	3		451	3	
440	25	18	15696	12489	3910	1653	1541	13		538	9	
440	25	20	18558	12486	3891	1551	1860	32	2-	584	20	1-
440	30	• 6-	2107	14662	23025	67356	28174			29504		
440	30	• 8-	3483	14754	17162	32028	22308			17521		
440	30	10-	5275	14860	12326	15841	18336	3	5-	11521	3	9-
440	30	12-	7485	14921	9080	8410	15487	36	45-	8109	38	70-
440	30	14	10050	14952	7081	4998	856			384		
440	30	16	12842	14966	6023	3473	1579	5		541	4	
440	30	18	15712	14980	5610	2839	1850	19	1-	646	13	1-
440	30	20	18572	14975	5585	2631	2232	46	3-	701	29	3-
440	35	• 8-	5537	17171	22106	46461	25701			20186		
440	35	10-	5321	17297	16257	23848	21226	4	8-	13337	5	15-
440	35	12-	7519	17384	12135	12957	17987	51	72-	9418	53	114-
440	35	14	10078	17422	9529	7791	1003			450		
440	35	16	12864	17450	8144	5457	1612	7		635	5	
440	35	18	15731	17462	7597	4473	2159	25	2-	754	18	2-
440	35	20	18589	17450	7568	4149	2602	62	4-	818	39	4-
440	40	• 8-	3593	19587	27543	63413	29019			22791		
440	40	10-	5370	19725	20496	33665	24063	6	13-	15119	7	24-
440	40	12-	7560	19832	15522	18699	20451	68	110-	10708	71	173-
440	40	14	10110	19892	12299	11406	1153	1		510	1	
440	40	16	12889	19923	10553	8042	1846	9		725	7	1-
440	40	18	15752	19941	9869	6619	2469	33	3-	862	23	4-
440	40	20	18608	19920	9836	6145	2973	82	6-	934	51	6-
460	5	6-	1858	2494	.1035	.00650	5200	.0000	.00000	5445	.0000	.00000
460	5	8-	3287	2498	593	212	3918			3077		
460	5	10-	5129	2502	385	88	3143			1975		
460	5	12-	7377	2500	267	43	2618			1371		
460	5	14	9986	2506	202	24	125			56		
460	5	16	12834	2507	168	16	209			82		
460	5	18	15776	2506	153	13	207			100		
460	5	20	18714	2503	150	11	352			110		
460	10	6-	1892	4958	3857	4629	10221			10703		
460	10	8-	3309	4984	2313	1626	7787			6116		
460	10	10-	5144	4993	1511	688	6260			3934		
460	10	12-	7387	4997	1061	338	5229	3	1-	2738	3	2-
460	10	14	9993	4994	802	191	249			112		
460	10	16	12840	5008	669	129	419			164		
460	10	18	15781	5014	612	102	575	2		201	1	
460	10	20	18718	4999	597	91	702	4		221	2	
460	15	6-	1939	7392	7912	13435	14999			15706		
460	15	8-	3342	7453	5008	5155	11571			9088		
460	15	10-	5166	7480	3341	2259	9352			5876		
460	15	12-	7403	7490	2367	1125	7827	6	4-	4098	6	6-
460	15	14	10005	7494	1799	641	375			168		
460	15	16	12849	7496	1496	430	627			246		
460	15	18	15788	7493	1364	339	860	3		300	2	
460	15	20	18725	7493	1340	307	1055	9		331	6	
460	20	• 6-	1993	9810	12754	27125	19555			20478		
460	20	8-	3383	9902	8492	11311	15253			11980		

APPENDIX I

STOKES-STRUIK THIRD-APPROXIMATION COEFFICIENTS FOR AN ASSEMBLAGE OF WAVE CONDITIONS (CONTINUED)

d	H	T	L	η_1	η_2	η_3	V_1	V_2	V_3	a_1	o_2	o_3
460	20	16	12861	9990	.2649	.01012	.837	0001	00000	.329	0001	.00000
460	20	18	15798	10000	2425	805	1149	6		401	4	
460	20	20	18754	9996	2382	727	1406	16		442	10	
460	25	• 6-	2050	12228	18111	45261	23934			25063		
460	25	8-	3431	12333	12588	20272	18828			14788		
460	25	10-	5233	12413	8825	9635	15394	1	2-	9672	1	3-
460	25	12-	7453	12447	6397	4983	12953	18	18-	6782	18	29-
460	25	14	10042	12475	4925	2900	629			282		
460	25	16	12877	12487	4123	1964	1049	2		412	2	
460	25	18	15811	12496	3778	1562	1437	10		502	7	
460	25	20	18745	12486	3710	1412	1756	25	1-	552	16	1-
460	30	• 6-	2107	14662	23825	67356	28174			29504		
460	30	• 8-	5483	14754	17161	32028	22308			17520		
460	30	10-	5275	14860	12325	15839	18336	2	3-	11521	2	6-
460	30	12-	7405	14921	9065	8387	15485	26	32-	8108	27	50-
460	30	14	10067	14954	7022	4952	758			340		
460	30	16	12897	14969	5898	3557	1260	5		495	3	
460	50	18	15827	14981	5414	2678	1724	14	1-	602	10	1-
460	50	20	18759	14990	5337	2436	2110	36	2-	663	25	2-
460	35	• 0-	3537	17171	22106	46461	25701			20186		
460	35	10-	5321	17277	16236	23844	21226	3	5-	13337	5	9-
460	35	12-	7522	17384	12112	12922	17985	56	52-	9417	38	82-
460	55	14	10095	17422	9447	7684	889			399		
460	35	16	12919	17449	7972	5271	1475	5		578	4	
460	35	18	15845	17461	7331	4217	2012	19	2-	702	13	2-
460	35	20	18775	17467	7230	3840	2460	49	3-	773	31	3-
460	40	• 8-	3593	19588	27343	63414	29019			22791		
440	40	10-	5370	19725	20494	33660	24063	4	8-	15119	4	15-
460	40	12-	7562	19832	15495	18647	20448	49	79-	10707	51	124-
460	40	14	10127	19894	12195	11252	1023			459		
460	40	16	12944	19925	10354	7772	1687	6		662	5	
460	40	18	15866	19938	9522	6239	2301	25	2-	805	17	3-
460	40	20	18793	19946	9402	5692	2811	64	5-	883	40	5-
480	5	8-	3287	2498	.0593	.00212	3919	.0000	.00000	3078	.0000	.00000
480	5	10-	5129	2495	301	87	3134			1969		
480	5	12-	7579	2502	267	43	2620			1372		
480	5	14	9999	2506	201	24	110			50		
480	5	16	12881	2503	164	16	191			75		
480	5	18	15878	2489	146	12	266			93		
480	5	20	18886	2500	143	11	332			104		
480	10	0-	5309	4984	2313	1626	7786			6115		
480	10	10-	5144	4993	1510	688	6261			3934		
480	10	12-	7389	4997	1060	338	5229	2		2738	2	1-
480	10	14	10006	5006	800	190	221			99		
480	10	16	12886	5001	655	124	582			150		
480	10	18	15885	5002	590	96	555	1		187		
480	10	20	18889	5009	574	05	665	3		209	2	
480	15	0-	3342	7452	5007	5153	11570			9087		
480	15	10-	5166	7480	5341	2259	9352			5876		
480	15	12-	7405	7496	2368	1126	7032	4	3-	4101	5	4-
480	15	14	10018	7495	1707	635	332			149		
480	15	16	12895	7497	1470	417	573			225		
480	15	10	15890	7497	1325	523	802	5		280	2	
488	20	0-	3383	9901	0489	11306	15251			11970		
480	20	10-	5197	9951	5002	5155	12596			7789		
480	20	12-	7427	9976	4154	2612	10405	8	7-	5448	8	10-
480	20	14	10035	9986	3156	1488	444			199		
480	20	16	12908	9990	2602	983	764	1		500		
480	20	10	15900	9992	2546	761	1070	5		575	5	
480	20	20	18904	9995	2200	675	1527	15		417	8	
480	55	0-	3431	12353	12588	20272	10828			14788		
480	25	10-	5253	12412	8825	9632	15393		1-	9672		2-
480	25	12-	7455	12446	6389	4973	12950	15	13-	6701	15	20-
480	25	14	10055	12475	4892	2069	557			250		
480	25	16	12924	12488	4050	1908	958	2		576	1	
480	25	18	15915	12487	3656	1480	1558	7		447	5	
480	25	20	18915	12492	3556	1315	1659	20	1-	521	12	
480	30	• 0-	3485	14754	17161	52027	22308			17520		
480	30	10-	5275	14860	12525	15838	10557	1	2-	11521	1	5-
480	30	12-	7487	14921	9054	8571	15485	19	25-	8107	19	36-
480	30	24	10080	14954	6976	4879	672			301		
480	30	16	12943	14969	5795	5261	1151	2		492	2	
480	30	16	15929	14982	5247	2544	1607	10		561	7	
480	30	20	18929	14976	5105	2299	1991	28	2-	625	16	2-
480	55	• 8-	3557	17171	22106	46461	25701			20186		
480	55	10-	5321	17297	16255	23843	21226	2	5-	13357	2	6-
480	55	12-	7524	17382	12095	12095	17981	26	57-	9415	27	58-
480	35	14	10109	17424	9385	7604	788			554		
480	55	16	12966	17451	7632	5122	1545	5		528	5	

d	H	T	L	η_1	η_2	η_3	V_1	V_2	V_5	o_1	o_2	o_3
480	35	18	15947	17461	7104	04004	1875	0014	.00001-	.655	.0010	00001-
480	55	20	18945	17465	6921	3569	2323	39	3-	730	24	3-
480	40	• 8-	3593	19588	27344	63416	29019			22792		
480	40	10-	5370	19725	20493	33656	24063	2	5-	15119	3	9-
480	40	12-	7564	19833	15475	18610	20446	35	57-	10706	37	89-
480	40	14	10141	19895	12113	11151	906			407		
480	40	16	12991	19925	10148	7547	1541	4		605	3	
480	40	18	15968	19942	9231	5928	2145	19	2-	749	13	2-
480	40	20	18963	19950	9007	5296	2656	51	4-	834	32	4-
500	5	8-	3287	2499	.0594	.00212	3920	0000	.00000	3079	0000	.00000
500	5	10-	5150	2501	382	88	3141			1974		
500	5	12-	7380	2502	267	43	2620			1372		
500	5	14	10009	2500	199	24	97			44		
500	5	16	12920	2505	162	15	174			68		
500	5	18	15969	2501	144	11	249			87		
500	5	20	19042	2498	137	10	313			98		
500	10	8-	3309	4985	2314	1626	7788			6116		
500	10	10-	5144	4995	1510	688	6260			5954		
500	10	12-	7390	4999	1060	338	5231	1		2739	1	
500	10	14	10017	5007	796	189	195			88		
500	10	16	12926	4999	645	121	348			137		
500	10	18	15973	4992	571	91	497			174		
500	10	20	19046	5011	552	80	628	2		197	2	
500	15	8-	5342	7453	5007	5153	11570			9087		
500	15	10-	5166	7479	3540	2258	9350			5875		
500	15	12-	7406	7490	2362	1122	7826	3	2-	4098	3	3-
500	15	14	10029	7502	1781	631	294			132		
500	15	16	12955	7499	1449	408	523			205		
500	15	18	15981	7500	1288	309	747	2		261	1	
500	15	20	19052	7502	1256	268	941	6		295	3	
500	20	8-	3385	9901	8489	11306	15251			11978		
500	20	10-	5197	9955	5806	5160	12401			7792		
500	20	12-	7428	9975	4149	2607	10402	6	5-	5447	6	7-
500	20	14	10045	9986	5139	1476	593			176		
500	20	16	12947	9991	2563	959	698			274		
500	20	18	15991	9994	2285	728	997	3		348	2	
500	20	20	19060	9996	2192	632	1254	10		394	6	
500	25	8-	3431	12333	12588	20271	18828			14787		
500	25	10-	5233	12413	8824	9634	15394			9673		1-
500	25	12-	7456	12449	6586	4969	12952	9	9-	6782	9	15-
500	25	14	10066	12475	4867	2846	493			221		
500	25	16	12963	12481	3905	1859	873	1		345		
500	25	18	16004	12483	3554	1413	1246	5		435	4	
500	25	20	19071	12501	3423	1233	1569	16		493	10	
500	30	• 0-	3405	14754	17161	32026	22307			17520		
500	30	10-	5275	14062	12326	15842	18338		1-	11522		2-
500	30	12-	7488	14927	9053	8369	15408	13	16-	8110	14	26-
500	30	14	10091	14954	6938	4857	595			267		
500	30	16	12983	14971	5707	3185	1050	2		412	1	
500	30	18	16019	14978	5101	2428	1497	8		523	5	
500	30	20	19085	14990	4912	2120	1802	22	1-	591	14	1-
500	35	• 8-	3537	17171	22107	46465	25702			20186		
500	35	10-	5521	17298	16236	25845	21227		2-	13357	1	4-
500	35	12-	7525	17302	12085	12875	17979	19	27-	9414	20	42-
500	55	14	10119	17427	9359	7543	698			315		
500	35	16	13005	17451	7715	4997	1228	2		482	2	
500	35	18	16037	17462	6910	3827	1740	11		610	7	
500	35	20	19100	17473	6659	5345	2195	31	2-	690	19	2-
500	40	• 0-	3594	19588	27545	65421	29020			22792		
500	40	10-	5570	19725	20492	33634	24063	1	3-	15119	2	6-
500	40	12-	7565	19834	15463	18586	20446	25	41-	10705	26	64-
500	40	14	10151	19897	12051	11059	803			560		
500	40	16	13031	19929	9999	7568	1407	5		555	2	
500	40	18	16058	19946	8982	5667	2000	14	1-	698	10	1-
500	40	20	19110	19954	8662	4961	2509	40	3-	788	25	3-

APPENDIX II

Table 1	Circular Sines and Cosines for Integral Multiples of θ
Table 2	Hyperbolic Sines and Cosines for Integral Multiples of $2\pi z/L$

The decimal point position is indicated by the vertical lines.

APPENDIX II

TABLE I CIRCULAR SINES AND COSINES FOR INTEGRAL MULTIPLES OF θ

(Degrees) θ	(Radians) θ	Sin. θ	Cos. θ	Sin 2θ	Cos. 2θ	Sin 3θ	Cos 3θ
0	0	0	10000	0	10000	0	10000
1	0175	0175	9998	0349	9994	0523	9986
2	0349	0349	9994	0698	9976	1045	9945
3	0524	0523	9986	1045	9945	1564	9877
4	0698	0698	9976	1392	9903	2079	9781
5	0873	0872	9962	1736	9348	2588	9659
6	1047	1045	9945	2079	9781	3090	9511
7	1222	1219	9925	2419	9703	3584	9336
8	1396	1392	9903	2756	9613	4067	9135
9	1571	1564	9877	3090	9511	4540	8910
10	1745	1736	9848	3420	9397	5000	8660
11	1920	1908	9816	3746	9272	5446	8387
12	2094	2079	9781	4067	9135	5878	8090
13	2269	2250	9744	4384	8988	6293	7771
14	2443	2419	9703	4695	8829	6691	7431
15	2618	2588	9659	5000	8660	7071	7071
16	2793	2756	9613	5299	8480	7431	6691
17	2967	2924	9563	5592	8290	7771	6293
18	3142	3090	9511	5878	8090	8090	5878
19	3316	3256	9455	6157	7880	8387	5446
20	3491	3420	9397	6428	7660	8660	5000
21	3665	3584	9336	6691	7431	8910	4540
22	3840	3746	9272	6947	7193	9135	4067
23	4014	3907	9205	7193	6947	9336	3584
24	4189	4067	9135	7431	6691	9511	3090
25	4363	4226	9063	7660	6428	9659	2588
26	4538	4384	8988	7880	6157	9781	2079
27	4712	4540	8910	8090	5878	9877	1564
28	4887	4695	8829	8290	5592	9945	1045
29	5061	4848	8746	8480	5299	9986	0523
30	5236	5000	8660	8660	5000	10000	0
31	5411	5150	8572	8829	4695	9986	0523-
32	5585	5299	8480	8988	4384	9945	1045-
33	5760	5446	8387	9135	4067	9877	1564-
34	5934	5592	8290	9272	3746	9781	2079-
35	6109	5736	8192	9397	3420	9659	2588-
36	6283	5878	8090	9511	3090	9511	3090-
37	6458	6018	7986	9613	2756	9336	3584-
38	6632	6157	7880	9703	2419	9135	4067-
39	6807	6293	7771	9781	2079	8910	4540-
40	6981	6428	7660	9848	1736	8660	5000-
41	7156	6561	7547	9903	1392	8387	5446-
42	7330	6691	7431	9945	1045	8090	5878-
43	7505	6820	7314	9976	0698	7771	6293-
44	7679	6947	7193	9994	0349	7431	6691-
45	7854	7071	7071	10000	0	7071	7071-
46	8029	7193	6947	9994	0349-	6691	7431-
47	8203	7314	6820	9976	0698-	6293	7771-
48	8378	7431	6691	9945	1045-	5878	8090-
49	8552	7547	6561	9903	1392-	5446	8387-
50	8727	7660	6428	9848	1736-	5000	8660-
51	8901	7771	6293	9781	2079-	4540	8910-
52	9076	7880	6157	9703	2419-	4067	9135-
53	9250	7986	6018	9613	2756-	3584	9336-
54	9425	8090	5878	9511	3090-	3090	9511-
55	9599	8192	5736	9397	3420-	2588	9659-
56	9774	8290	5592	9272	3746-	2079	9781-
57	9948	8387	5446	9135	4067-	1564	9877-
58	10123	8480	5299	8988	4384-	1045	9945-
59	10297	8572	5150	8829	4695-	0523	9986-
60	10472	8660	5000	8660	5000-	0	10000-
61	10647	8746	4848	8480	5299-	0523-	9986-
62	10821	8829	4695	8290	5592-	1045-	9945-
63	10996	8910	4540	8090	5878-	1564-	9877-
64	11170	8988	4384	7880	6157-	2079-	9781-
65	11345	9063	4226	7660	6428-	2588-	9659-
66	11519	9135	4067	7431	6691-	3090-	9511-
67	11694	9205	3907	7193	6947-	3584-	9336-
68	11868	9272	3746	6947	7193-	4067-	9135-
69	12043	9336	3584	6691	7431-	4540-	8910-
70	12217	9397	3420	6428	7660-	5000-	8660-
71	12392	9455	3256	6157	7880-	5446-	8387-
72	12566	9511	3090	5878	8090-	5878-	8090-
73	12741	9563	2924	5592	8290-	6293-	7771-
74	12915	9613	2756	5299	8480-	6691-	7431-
75	13090	9659	2588	5000	8660-	7071-	7071-
76	13265	9703	2419	4695	8829-	7431-	6691-
77	13439	9744	2250	4384	8988-	7771-	6293-
78	13614	9781	2079	4067	9135-	8090-	5878-
79	13788	9816	1908	3746	9272-	8387-	5446-
80	13963	9848	1736	3420	9397-	8660-	5000-
81	14137	9877	1564	3090	9511-	8910-	4540-
82	14312	9903	1392	2756	9613-	9135-	4067-
83	14486	9925	1219	2419	9703-	9336-	3584-
84	14661	9945	1045	2079	9781-	9511-	3090-
85	14835	9962	0872	1736	9848-	9659-	2588-
86	15010	9976	0698	1392	9903-	9781-	2079-
87	15184	9986	0523	1045	9945-	9877-	1564-
88	15359	9994	0349	0698	9976-	9945-	1045-
89	15533	9998	0175	0349	9994-	9986-	0523-
90	15708	10000	0	0	10000-	10000-	0
91	15882	9998	0175-	0349-	9994-	9986-	0523
92	16057	9994	0349-	0698-	9976-	9945-	1045
93	16232	9986	0523-	1045-	9945-	9877-	1564
94	16406	9976	0698-	1392-	9903-	9781-	2079
95	16581	9962	0872-	1736-	9848-	9659-	2588
96	16755	9945	1045-	2079-	9781-	9511-	3090
97	16930	9925	1219-	2419-	9703-	9336-	3584
98	17104	9903	1392-	2756-	9613-	9135-	4067
99	17279	9877	1564-	3090-	9511-	8910-	4540
100	17453	9848	1736-	3420-	9397-	8660-	5000
101	17628	9816	1908-	3746-	9272-	8387-	5446
102	17802	9781	2079-	4067-	9135-	8090-	5878
103	17977	9744	2250-	4384-	8988-	7771-	6293
104	18151	9703	2419-	4695-	8829-	7431-	6691
105	18326	9659	2588-	5000-	8660-	7071-	7071
106	18500	9613	2756-	5299-	8480-	6691-	7431
107	18675	9563	2924-	5592-	8290-	6293-	7771
108	18850	9511	3090-	5878-	8090-	5878-	8090
109	19024	9455	3256-	6157-	7880-	5446-	8387
110	19199	9397	3420-	6428-	7660-	5000-	8660
111	19373	9336	3584-	6691-	7431-	4540-	8910
112	19548	9272	3746-	6947-	7193-	4067-	9135
113	19722	9205	3907-	7193-	6947-	3584-	9336
114	19897	9135	4067-	7431-	6691-	3090-	9511
115	20071	9063	4226-	7660-	6428-	2588-	9659
116	20246	8988	4384-	7880-	6157-	2079-	9781
117	20420	8910	4540-	8090-	5878-	1564-	9877
118	20595	8829	4695-	8290-	5592-	1045-	9945
119	20769	8746	4848-	8480-	5299-	0523-	9986
120	20944	8660	5000-	8660-	5000-	0	10000

Vertical lines indicate the decimal point position

APPENDIX II
TABLE I CONTINUED

(Degrees) θ	(Radians) θ	Sin θ	Cos. θ	Sin. 2 θ	Cos 2 θ	Sin. 3 θ	Cos. 3 θ
121	21118	8572	5150-	8829-	4695-	0523	9986
122	21293	8480	5299-	8988-	4384-	1045	9945
123	21468	8387	5446-	9135-	4067-	1564	9877
124	21642	8290	5592-	9272-	3746-	2079	9781
125	21817	8192	5736-	9397-	3420-	2588	9659
126	21991	8090	5878-	9511-	3090-	3090	9511
127	22166	7986	6018-	9613-	2756-	3584	9336
128	22340	7880	6157-	9703-	2419-	4067	9135
129	22515	7771	6293-	9781-	2079-	4540	8910
130	22689	7660	6428-	9848-	1736-	5000	8660
131	22864	7547	6561-	9903-	1392-	5446	8387
132	23038	7431	6691-	9945-	1045-	5878	8090
133	23213	7314	6820-	9976-	0698-	6293	7771
134	23387	7193	6947-	9994-	0349-	6691	7431
135	23562	7071	7071-	10000-	0	7071	7071
136	23736	6947	7193-	9994-	0349	7431	6691
137	23911	6820	7314-	9976-	0698	7771	6293
138	24086	6691	7431-	9945-	1045	8090	5878
139	24260	6561	7547-	9903-	1392	8387	5446
140	24435	6428	7660-	9848-	1736	8660	5000
141	24609	6293	7771-	9781-	2079	8910	4540
142	24784	6157	7880-	9703-	2419	9135	4067
143	24958	6018	7986-	9613-	2756	9336	3584
144	25133	5878	8090-	9511-	3090	9511	3090
145	25307	5736	8192-	9397-	3420	9659	2588
146	25482	5592	8290-	9272-	3746	9781	2079
147	25656	5446	8387-	9135-	4067	9877	1564
148	25831	5299	8480-	8988-	4384	9945	1045
149	26005	5150	8572-	8829-	4695	9986	0523
150	26180	5000	8660-	8660-	5000	10000	0
151	26354	4848	8746-	8480-	5299	9986	0523-
152	26529	4695	8829-	8290-	5592	9945	1045-
153	26704	4540	8910-	8090-	5878	9877	1564-
154	26878	4384	8988-	7880-	6157	9781	2079-
155	27053	4226	9063-	7660-	6428	9659	2588-
156	27227	4067	9135-	7431-	6691	9511	3090-
157	27402	3907	9205-	7193-	6947	9336	3584-
158	27576	3746	9272-	6947-	7193	9135	4067-
159	27751	3584	9336-	6691-	7431	8910	4540-
160	27925	3420	9397-	6428-	7660	8660	5000-
161	28100	3256	9455-	6157-	7880	8387	5446-
162	28274	3090	9511-	5878-	8090	8090	5878-
163	28449	2924	9563-	5592-	8290	7771	6293-
164	28623	2756	9613-	5299-	8480	7431	6691-
165	28798	2588	9659-	5000-	8660	7071	7071-
166	28972	2419	9703-	4695-	8829	6691	7431-
167	29147	2250	9744-	4384-	8988	6293	7771-
168	29322	2079	9781-	4067-	9135	5878	8090-
169	29496	1908	9816-	3746-	9272	5446	8387-
170	29671	1736	9848-	3420-	9397	5000	8660-
171	29845	1564	9877-	3090-	9511	4540	8910-
172	30020	1392	9903-	2756-	9613	4067	9135-
173	30194	1219	9925-	2419-	9703	3584	9336-
174	30369	1045	9945-	2079-	9781	3090	9511-
175	30543	0872	9962-	1736-	9848	2588	9659-
176	30718	0698	9976-	1392-	9903	2079	9781-
177	30892	0523	9986-	1045-	9945	1564	9877-
178	31067	0349	9994-	0698-	9976	1045	9945-
179	31241	0175	9998-	0349-	9994	0523	9986-
180	31416	0	10000-	0	10000	0	10000-
181	31590	0175-	9998-	0349	9994	0523-	9986-
182	31765	0349-	9994-	0698	9976	1045-	9945-
183	31940	0523-	9986-	1045	9945	1564-	9877-
184	32114	0698-	9976-	1392	9903	2079-	9781-
185	32289	0872-	9962-	1736	9848	2588-	9659-
186	32463	1045-	9945-	2079	9781	3090-	9511-
187	32638	1219-	9925-	2419	9703	3584-	9336-
188	32812	1392-	9903-	2756	9613	4067-	9135-
189	32987	1564-	9877-	3090	9511	4540-	8910-
190	33161	1736-	9848-	3420	9397	5000-	8660-
191	33336	1908-	9816-	3746	9272	5446-	8387-
192	33510	2079-	9781-	4067	9135	5878-	8090-
193	33685	2250-	9744-	4384	8988	6293-	7771-
194	33859	2419-	9703-	4695	8829	6691-	7431-
195	34034	2588-	9659-	5000	8660	7071-	7071-
196	34208	2756-	9613-	5299	8480	7431-	6691-
197	34383	2924-	9563-	5592	8290	7771-	6293-
198	34558	3090-	9511-	5878	8090	8090-	5878-
199	34732	3256-	9455-	6157	7880	8387-	5446-
200	34907	3420-	9397-	6428	7660	8660-	5000-
201	35081	3584-	9336-	6691	7431	8910-	4540-
202	35256	3746-	9272-	6947	7193	9135-	4067-
203	35430	3907-	9205-	7193	6947	9336-	3584-
204	35605	4067-	9135-	7431	6691	9511-	3090-
205	35779	4226-	9063-	7660	6428	9659-	2588-
206	35954	4384-	8988-	7880	6157	9781-	2079-
207	36128	4540-	8910-	8090	5878	9877-	1564-
208	36303	4695-	8829-	8290	5592	9945-	1045-
209	36477	4848-	8746-	8480	5299	9986-	0523-
210	36652	5000-	8660-	8660	5000	10000-	0
211	36826	5150-	8572-	8829	4695	9986-	0523
212	37001	5299-	8480-	8988	4384	9945-	1045
213	37176	5446-	8387-	9135	4067	9877-	1564
214	37350	5592-	8290-	9272	3746	9781-	2079
215	37525	5736-	8192-	9397	3420	9659-	2588
216	37699	5878-	8090-	9511	3090	9511-	3090
217	37874	6018-	7986-	9613	2756	9336-	3584
218	38048	6157-	7880-	9703	2419	9135-	4067
219	38223	6293-	7771-	9781	2079	8910-	4540
220	38397	6428-	7660-	9848	1736	8660-	5000
221	38572	6561-	7547-	9903	1392	8387-	5446
222	38746	6691-	7431-	9945	1045	8090-	5878
223	38921	6820-	7314-	9976	0698	7771-	6293
224	39095	6947-	7193-	9994	0349	7431-	6691
225	39270	7071-	7071-	10000	0	7071-	7071
226	39444	7193-	6947-	9994	0349-	6691-	7431
227	39619	7314-	6820-	9976	0698-	6293-	7771
228	39794	7431-	6691-	9945	1045-	5878-	8090
229	39968	7547-	6561-	9903	1392-	5446-	8387
230	40143	7660-	6428-	9848	1736-	5000-	8660
231	40317	7771-	6293-	9781	2079-	4540-	8910
232	40492	7880-	6157-	9703	2419-	4067-	9135
233	40666	7986-	6018-	9613	2756-	3584-	9336
234	40841	8090-	5878-	9511	3090-	3090-	9511
235	41015	8192-	5736-	9397	3420-	2588-	9659
236	41190	8290-	5592-	9272	3746-	2079-	9781
237	41364	8387-	5446-	9135	4067-	1564-	9877
238	41539	8480-	5299-	8988	4384-	1045-	9945
239	41713	8572-	5150-	8829	4695-	0523-	9986
240	41888	8660-	5000-	8660	5000-	0	10000

THE USE OF THE STOKES-STRUIK APPROXIMATION FOR WAVES OF FINITE HEIGHT

APPENDIX II
TABLE I CONTINUED

(Degrees) θ	(Radians) θ	Sin θ	Cos θ	Sin 2 θ	Cos.2 θ	Sin 3 θ	Cos 3 θ
241	42062	8746-	4848-	8480	5299-	0523	9986
242	42237	8829-	4695-	8290	5592-	1045	9945
243	42412	8910-	4540-	8090	5878-	1564	9877
244	42586	8988-	4384-	7880	6157-	2079	9781
245	42761	9063-	4226-	7660	6428-	2588	9659
246	42935	9135-	4067-	7431	6691-	3090	9511
247	43110	9205-	3907-	7193	6947-	3584	9336
248	43284	9272-	3746-	6947	7193-	4067	9135
249	43459	9336-	3584-	6691	7431-	4540	8910
250	43633	9397-	3420-	6428	7660-	5000	8660
251	43808	9455-	3256-	6157	7880-	5446	8387
252	43982	9511-	3090-	5878	8090-	5878	8090
253	44157	9563-	2924-	5592	8290-	6293	7771
254	44331	9613-	2756-	5299	8480-	6691	7431
255	44506	9659-	2588-	5000	8660-	7071	7071
256	44680	9703-	2419-	4695	8829-	7431	6691
257	44855	9744-	2250-	4384	8988-	7771	6293
258	45029	9781-	2079-	4067	9135-	8090	5878
259	45204	9816-	1908-	3746	9272-	8387	5446
260	45379	9848-	1736-	3420	9397-	8660	5000
261	45553	9877-	1564-	3090	9511-	8910	4540
262	45728	9903-	1392-	2756	9613-	9135	4067
263	45902	9925-	1219-	2419	9703-	9336	3584
264	46077	9945-	1045-	2079	9781-	9511	3090
265	46251	9962-	0872-	1736	9848-	9659	2588
266	46426	9976-	0698-	1392	9903-	9781	2079
267	46600	9986-	0523-	1045	9945-	9877	1564
268	46775	9994-	0349-	0698	9976-	9945	1045
269	46949	9998-	0175-	0349	9994-	9986	0523
270	47124	10000-	0	0	10000-	10000	0
271	47298	9998-	0175	0349-	9994-	9986	0523-
272	47473	9994-	0349	0698-	9976-	9945	1045-
273	47647	9986-	0523	1045-	9945-	9877	1564-
274	47822	9976-	0698	1392-	9903-	9781	2079-
275	47997	9962-	0872	1736-	9848-	9659	2588-
276	48171	9945-	1045	2079-	9781-	9511	3090-
277	48346	9925-	1219	2419-	9703-	9336	3584-
278	48520	9903-	1392	2756-	9613-	9135	4067-
279	48695	9877-	1564	3090-	9511-	8910	4540-
280	48869	9848-	1736	3420-	9397-	8660	5000-
281	49044	9816-	1908	3746-	9272-	8387	5446-
282	49218	9781-	2079	4067-	9135-	8090	5878-
283	49393	9744-	2250	4384-	8988-	7771	6293-
284	49567	9703-	2419	4695-	8829-	7431	6691-
285	49742	9659-	2588	5000-	8660-	7071	7071-
286	49916	9613-	2756	5299-	8480-	6691	7431-
287	50091	9563-	2924	5592-	8290-	6293	7771-
288	50265	9511-	3090	5878-	8090-	5878	8090-
289	50440	9455-	3256	6157-	7880-	5446	8387-
290	50615	9397-	3420	6428-	7660-	5000	8660-
291	50789	9336-	3584	6691-	7431-	4540	8910-
292	50964	9272-	3746	6947-	7193-	4067	9135-
293	51139	9205-	3907	7193-	6947-	3584	9336-
294	51313	9135-	4067	7431-	6691-	3090	9511-
295	51487	9063-	4226	7660-	6428-	2588	9659-
296	51662	8988-	4384	7880-	6157-	2079	9781-
297	51836	8910-	4540	8090-	5878-	1564	9877-
298	52011	8829-	4695	8290-	5592-	1045	9945-
299	52185	8746-	4848	8480-	5299-	0523	9986-
300	52360	8660-	5000	8660-	5000-	0	10000-
301	52534	8572-	5150	8829-	4695-	0523-	9986-
302	52709	8480-	5299	8988-	4384-	1045-	9945-
303	52883	8387-	5446	9135-	4067-	1564-	9877-
304	53058	8290-	5592	9272-	3746-	2079-	9781-
305	53233	8192-	5736	9397-	3420-	2588-	9659-
306	53407	8090-	5878	9511-	3090-	3090-	9511-
307	53582	7986-	6018	9613-	2756-	3584-	9336-
308	53756	7880-	6157	9703-	2419-	4067-	9135-
309	53931	7771-	6293	9781-	2079-	4540-	8910-
310	54105	7660-	6428	9848-	1736-	5000-	8660-
311	54280	7547-	6561	9903-	1392-	5446-	8387-
312	54454	7431-	6691	9945-	1045-	5878-	8090-
313	54629	7314-	6820	9976-	0698-	6293-	7771-
314	54803	7193-	6947	9994-	0349-	6691-	7431-
315	54978	7071-	7071	10000-	0	7071-	7071-
316	55152	6947-	7193	9994-	0349	7431-	6691-
317	55327	6820-	7314	9976-	0698	7771-	6293-
318	55501	6691-	7431	9945-	1045	8090-	5878-
319	55676	6561-	7547	9903-	1392	8387-	5446-
320	55851	6428-	7660	9848-	1736	8660-	5000-
321	56025	6293-	7771	9781-	2079	8910-	4540-
322	56200	6157-	7880	9703-	2419	9135-	4067-
323	56374	6018-	7986	9613-	2756	9336-	3584-
324	56549	5878-	8090	9511-	3090	9511-	3090-
325	56723	5736-	8192	9397-	3420	9659-	2588-
326	56898	5592-	8290	9272-	3746	9781-	2079-
327	57072	5446-	8387	9135-	4067	9877-	1564-
328	57247	5299-	8480	8988-	4384	9945-	1045-
329	57421	5150-	8572	8829-	4695	9986-	0523-
330	57596	5000-	8660	8660-	5000	10000-	0
331	57770	4848-	8746	8480-	5299	9986-	0523
332	57945	4695-	8829	8290-	5592	9945-	1045
333	58119	4540-	8910	8090-	5878	9877-	1564
334	58294	4384-	8988	7880-	6157	9781-	2079
335	58469	4226-	9063	7660-	6428	9659-	2588
336	58643	4067-	9135	7431-	6691	9511-	3090
337	58818	3907-	9205	7193-	6947	9336-	3584
338	58992	3746-	9272	6947-	7193	9135-	4067
339	59167	3584-	9336	6691-	7431	8910-	4540
340	59341	3420-	9397	6428-	7660	8660-	5000
341	59516	3256-	9455	6157-	7880	8387-	5446
342	59690	3090-	9511	5878-	8090	8090-	5878
343	59865	2924-	9563	5592-	8290	7771-	6293
344	60039	2756-	9613	5299-	8480	7431-	6691
345	60214	2588-	9659	5000-	8660	7071-	7071
346	60388	2419-	9703	4695-	8829	6691-	7431
347	60563	2250-	9744	4384-	8988	6293-	7771
348	60737	2079-	9781	4067-	9135	5878-	8090
349	60912	1908-	9816	3746-	9272	5446-	8387
350	61087	1736-	9848	3420-	9397	5000-	8660
351	61261	1564-	9877	3090-	9511	4540-	8910
352	61436	1392-	9903	2756-	9613	4067-	9135
353	61610	1219-	9925	2419-	9703	3584-	9336
354	61785	1045-	9945	2079-	9781	3090-	9511
355	61959	0872-	9962	1736-	9848	2588-	9659
356	62134	0698-	9976	1392-	9903	2079-	9781
357	62308	0523-	9986	1045-	9945	1564-	9877
358	62483	0349-	9994	0698-	9976	1045-	9945
359	62657	0175-	9998	0349-	9994	0523-	9986

Vertical lines indicate the decimal point position

APPENDIX II

TABLE 2. HYPERBOLIC SINES & COSINES FOR INTEGRAL MULTIPLES OF $2\pi z/L$

z/L	Sinh $2\pi z/L$	Cosh $2\pi z/L$	Sinh $4\pi z/L$	Cosh $4\pi z/L$	Sinh $6\pi z/L$	Cosh $6\pi z/L$
0	0	10000000	0	10000000	0	10000000
010000000	062873200	10019746	12599470	10079061	18961375	10178180
020000000	12599470	10079061	25398165	10317494	38598460	10719068
030000000	18961375	10178180	38598460	10719068	59611035	11641940
040000000	25398165	10317494	52409080	11290134	82747900	12979682
050000000	31935255	10497553	67048400	12039721	10883357	14779968
060000000	38598460	10719068	82747905	12979683	13879762	17106952
070000000	45414095	10982915	99755825	14124881	17370783	20043555
080000000	52409075	11290134	11834111	15493424	21480830	23694431
090000000	59611035	11641940	13379762	17106952	26356363	28189677
10000000	67048400	12039721	16144881	18990976	32171131	33689489
11000000	74750550	12495049	18665236	21175290	39132348	40389858
12000000	82747900	12979682	21480830	23694431	47488076	48529551
13000000	91072030	13525574	24636031	26588231	57536090	58398640
14000000	99755820	14124880	28180782	29902449	69634450	70348820
15000000	10883357	14779968	32171134	33689492	84214295	84805945
16000000	11834110	15493423	36670179	38009236	10179521	10228521
17000000	12831599	16268065	41749059	42929989	12300367	12340949
18000000	13879762	17106952	47488091	48529556	14859548	14893158
19000000	14982736	18013394	53977990	54896480	17948262	17976098
20000000	16144981	18990976	61321410	62131440	21676580	21699634
21000000	17370783	20043555	69634455	70348825	26177362	26196456
22000000	18665286	21175290	79048570	79678580	31610996	31626809
23000000	20033500	22390648	89712615	90268225	38171119	38184216
24000000	21480830	23694431	10179521	10228521	46091501	46102348
25000000	23012989	25091785	11548741	11591955	55654400	55663380
26000000	24636031	26588231	13100571	13138682	67200590	67208030
27000000	26356363	28189677	14859550	14893160	81141535	81147695
28000000	28180782	29902449	16853490	16883131	97974035	97979135
29000000	30116488	31733308	19113920	19140061	11829792	11830215
30000000	32171131	33689489	21676592	21699636	14283747	14284097
31000000	34352819	35778711	24581997	24602329	17246716	17247006
32000000	36670176	38009233	27876107	27894038	20824285	20824525
33000000	39132343	40389854	31610999	31626812	25143949	25144148
34000000	41749055	42929985	35845728	35859674	30359638	30359803
35000000	44530639	45639652	40647261	40659560	36657222	36657358
36000000	47488076	48529551	46091510	46102357	44261121	44261234
37000000	50633055	51611105	52264565	52274135	53442300	53442390
38000000	53977985	54896475	59264035	59272475	64527945	64528025
39000000	57536090	58398640	67200600	67208040	77913105	77913165
40000000	61321405	62131435	76199750	76206310	94074765	94074815
41000000	65348890	66109590	86403790	86409570	11358887	11358891
42000000	69634450	70348820	97974045	97979145	13715081	13715085
43000000	74195005	74865875	11109349	11109799	16560025	16560028
44000000	79048560	79678570	12596956	12597353	19995099	19995102
45000000	84214295	84805945	14283749	14284099	24142718	24142720
46000000	89712605	90268215	16196398	16196707	29150685	29150687
47000000	95565205	96086985	18365148	18365420	35197460	35197461
48000000	10179520	10228520	20824290	20824530	42498532	42498533
49000000	10842720	10888736	23612708	23612920	51314075	51314075
50000000	11548740	11591954	26774495	26774682	61958240	61958240
51000000	12300367	12340949	30359644	30359809	74810350	74810350
52000000	13100570	13138681	34424844	34424989	90328385	90328385
53000000	13952508	13988298	39034376	39034504	10906536	10906536
54000000	14859548	14893158	44261125	44261238	13168894	13168894
55000000	15825269	15856833	50187745	50187845	15900548	15900548
56000000	16853488	16883129	56907930	56908020	19198815	19198815
57000000	17948262	17976098	64527960	64528040	23181268	23181268
58000000	19113918	19140059	73168315	73168385	27989783	27989783
59000000	20355055	20379604	82965615	82965675	33795766	33795766
60000000	21676580	21699634	94074785	94074835	40806098	40806098
61000000	23083706	23105356	10667148	10667153	49270549	49270549
62000000	24581995	24602327	12095488	12095492	59490850	59490850
63000000	26177359	26196453	13715083	13715087	71831100	71831100
64000000	27876105	27894036	15551544	15551547	86731190	86731190
65000000	29684934	29701773	17633910	17633913	10472193	10472193
66000000	31610996	31626809	19995105	19995108	12644464	12644464
67000000	33661894	33676744	22672465	22672467	15267333	15267333
68000000	35845725	35859671	25708326	25708328	18434252	18434252
69000000	38171119	38184216	29150691	29150693	22258110	22258110
70000000	40647253	40659552	33053991	33053993	26875133	26875133
71000000	43283912	43295462	37479946	37479947	32449902	32449902
72000000	46091501	46102348	42498540	42498541	39181020	39181020
73000000	49081116	49091302	48189128	48189129	47308427	47308427
74000000	52264555	52274125	54641690	54641690	57121665	57121665
75000000	55654400	55663380	61958260	61958260	68970540	68970540
76000000	59264020	59272460	70254520	70254520	83277255	83277255
77000000	63107700	63115620	79661655	79661655	10055154	10055154
78000000	67200585	67208025	90328410	90328410	12140918	12140918
79000000	71558865	71565855	10242346	10242346	14659320	14659320
80000000	76199735	76206295	11613806	11613806	17700137	17700137
81000000	81141535	81147695	13168907	13168907	21371695	21371695
82000000	86403760	86409550	14932224	14932224	25804873	25804873
83000000	92007225	92012655	16931665	16931665	31157605	31157605
84000000	97974035	97979135	19198834	19198834	37620697	37620697
85000000	10432775	10433254	21769557	21769557	45424443	45424443
86000000	11109348	11109798	24684525	24684525	54846880	54846880
87000000	11829792	11830215	27989810	27989810	66223895	66223895
88000000	12596955	12597352	31737646	31737646	79960785	79960785
89000000	13413863	13414236	35987351	35987351	96547230	96547230
90000000	14283747	14284097	40806098	40806098	11657413	11657413
91000000	15210037	15210366	46270080	46270080	14075536	14075536
92000000	16196395	16196704	52465645	52465645	16995256	16995256
93000000	17246714	17247004	59490850	59490850	20520600	20520600
94000000	18365144	18365416	67456740	67456740	24777234	24777234
95000000	19556099	19556355	76489195	76489195	29916802	29916802
96000000	20824285	20824525	86731190	86731190	36122511	36122511
97000000	22174708	22174933	98344590	98344590	43615442	43615442
98000000	23612704	23612916	11151304	11151304	52662690	52662690
99000000	25143947	25144146	12644464	12644464	63586570	63586570
10000000	26774489	26774676	14337571	14337571	76776470	76776470

Vertical lines indicate the decimal point position