Appendix B

DESCRIPTION OF SECOND-ORDER TEST RUNS

WAMIT V64S includes additional 12 standard test runs illustrating evaluation of various second-order quantities. It includes 5 low-order and 7 higher-order applications.

The following table gives relevant features of each test run. In this table, the first column *tst* denotes the name of the test run. All of the corresponding input/output files (except FNAMES.WAM) are assigned the filenames TEST.*tst*. (For example, the input POT file for the first test run listed below is TEST101.POT.) *tst* contains three digits starting with 1 for the second-order applications, the second digit is 0 for low-order test runs (ILOWHI=0), and 1 for higher-order test runs (ILOWHI=1). Test runs which are identical except for different input options are assigned the same number with a letter suffix. TEST111, TEST111a and TEST111b describes same physical problem using different options to represent the body and free surfaces. Both TEST103(TEST113) and TEST103a(TEST113a) consider the second-order solution of two body interaction. The option to evaluate approximate solution, by neglecting the second-order scattering potential, is used in TEST103(TEST113), while the complete solution is compluted in TEST113(TEST113a).

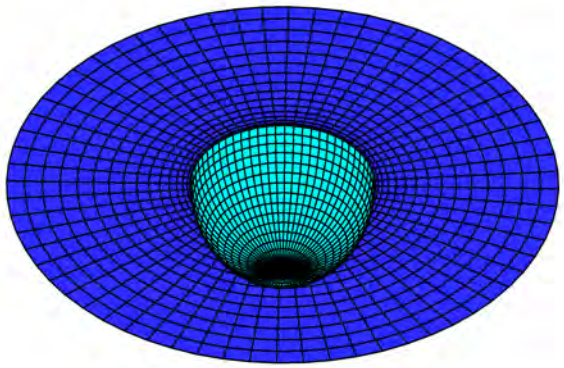
tst	geometry	ILOWHI	other parameters/comments
101	Sphere	0	IRR=1, ICTRSURF=1
102	Bottom mounted cylinder	0	IRR=1
103	Cylinder & spheroid	0	Free surface forcing ignored
103a	Cylinder & spheroid	0	NPF<0
104	Ellipsoid with internal tank	0	IRR=1,NPF<0
111	Sphere	1	IFDDEF<0, IRR=1, ICTRSURF=1
111a	Sphere	1	IFDDEF=1
111b	Sphere	1	IGDEF=2, NPATCHF<0
112	Bottom mounted cylinder	1	IRR=1
113	Cylinder & spheroid	1	Free surface forcing ignored
113a	Cylinder & spheroid	1	NPATCHF<0
114	Ellipsoid with internal tank	1	IRR=1, NPATCHF<0

B.1 Sphere – TEST101

The first-order exciting forces, motions, body pressures and velocities, wave elevations and velocities in the fluid, drift forces are evaluated for a hemisphere of radius 1 meter, in 3 meters of water depth. In addition, the second-order quadratic forces and complete second-order forces by direct and indirect methods, second-order hydrodynamic pressures on the body and in the fluid, the wave elevations, and motions are evaluated for two wave periods and one wave heading. Only the difference frequency solutions are evaluated in this test run.

Using two planes of symmetry, only the first quadrant of the surface of the hemisphere is discretized with 256 panels and the internal free surface is dsicretized with 256 panels (IRR=1).

The first quadrant of the inner region, an annulus between 1 and 3 meters, is discretized with 256 panels The intermediate region consists of two annuli of width 2.0 meters. On each annulus, $2^5 + 1$ nodes and 10 nodes Gauss quadratures are applied in the azimuthal and radial direction, respectively. Perspective view of the body and the inner region of the free surface is shown below.



```
TEST101.GDF: (first 8 lines only)
TEST101.gdf  sphere R=1 equal spacing
   1.000000       9.806650
          1           1
        512
  0.9951847      9.8017141E-02 -4.3711388E-08
   1.000000      0.0000000E+00 -4.3711388E-08
  0.9951847      0.0000000E+00 -9.8017186E-02
  0.9903926      9.7545162E-02 -9.8017186E-02

TEST101.POT:
TEST101.POT SPHERE R=1
 3.
 1           1               IRAD, IDIFF
 2                            NPER (array PER follows)
0.8 1.
 1                            NBETA (array BETA follows)
 0.
 1                            NBODY
 test101.gdf
 0. 0. 0. 0.                  XBODY
 1  1  1  1  1  1             IMODE(1-6)
 0                            NEWMDS

TEST101.FRC: (first 10 lines only)
TEST101.FRC
 0   0   1   1   3   1   2   2   2   1   1   1   1   1   1   1   (IOPTN 1-16)
 0.000000                                  VCG
 1.000000      .0000000      .0000000
 .0000000      1.000000      .0000000
 .0000000      .0000000      1.000000        XPRDCT
 0
32
   1.002404      4.9244434E-02  0.0000000E+00
  0.9927500      0.1472606      0.0000000E+00


TEST101.PT2:
TEST101.PT2
1  1          (radiation and diffraction for all modes)
1 1 1 1 1 1
0 1
3
1 1 1
```

```
1 1
2 2 1
1 1
1 2 1
1 1
```

TEST101.FDF: (first 8 lines only)

```
FDF for a sphere or vectical circular cylinder
   3.000000    RINNER
         256           48  NPF NTCL
           2   2.000000              5          10  (NAL etc.)
   0.100000E+01   0.100963E+01   0.100477E+01   0.995185E+00
   0.000000E+00   0.000000E+00   0.989611E-01   0.980171E-01
   0.995185E+00   0.100477E+01   0.990231E+00   0.980785E+00
   0.980171E-01   0.989611E-01   0.196969E+00   0.195090E+00
   .
   .
   .
```

TEST101.CFG:

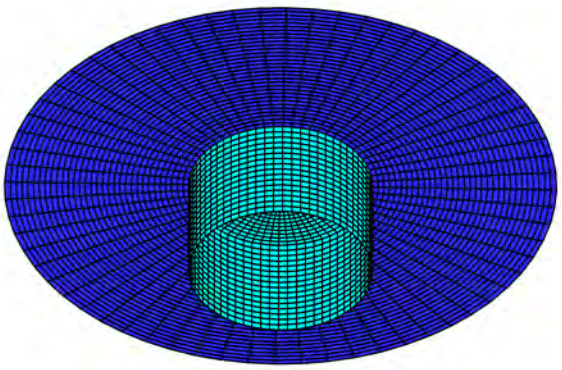
```
 IPLTDAT=1
 ILOWHI=0
 ISOR=1
 IALTPOT=2
 IRR=1
 ISOLVE=1
 IPERIO=3
 MONITR=0
 NUMHDR=1
 I2ND=1
 IPOTEN=1
 ILOG=1
 NOOUT= 1 1 1 1 0 1 1 1 1  1  1  1  0  1  1  1
 USERID_PATH=\WAMITv6   (directory for *.exe, *.dll, and userid.wam)
 ICTRSURF=1
```

B.2 BOTTOM MOUNTED CYLINDER – TEST102

The first-order quantities including exciting forces, pressures on the body and field points, wave elevations, drift forces are evaluated for a bottom mounted vertical circular cylinder of radius 1 meter and draft 1 meter, in finite water depth of 1 meter. In addition, the second-order quantities including quadratic forces, complete forces by direct and indirect methods, pressures on the body and field points, wave elevations are evaluated for two wave periods and one wave heading. One a sum frequency solution is evaluated in this test run.

Using two planes of symmetry, only the first quadrant of the surface of the cylinder and the interior free surface is discretized with 512 panels, 256 panels on each surface.

The first quadrant of the free surface inside the inner circle of radius 3 meters is represented by 512 panels. The intermediate region consists of two annuli of width 2.0 meters. On each annulus, 2^5+1 nodes and 10 nodes Gauss quadratures are applied in the azimuthal and radial directions, respectively. Perspective view of the body and the inner region of the free surface is shown below.



```
TEST102.GDF: (first 8 lines only)
Bottom mounted cylinder R=1 T=1
   1.000000       9.806650
          1           1
        512
  0.9951847      9.8017141E-02  0.0000000E+00
   1.000000      0.0000000E+00  0.0000000E+00
   1.000000      0.0000000E+00 -6.2500000E-02
  0.9951847      9.8017141E-02 -6.2500000E-02

TEST102.POT:
POT  for test102
 1.
-1           1               IRAD, IDIFF
 2                            NPER (array PER follows)
1.4 1.6
 1                            NBETA (array BETA follows)
 0.
 1                            NBODY
 test102.gdf
 0. 0. 0. 0.                  XBODY
 1  1  1  1  1  1             IMODE(1-6)
 0                            NEWMDS


TEST102.FRC: (first 10 lines only)
Bottom mounted Cylinder R=1, T=1
 0   0   1   0   3   1   1   2   2   1   1   1   1   1   1   0   (IOPTN 1-16)
 0.000000                                 VCG
 1.000000      .0000000      .0000000
 .0000000      1.000000      .0000000
 .0000000      .0000000      1.000000      XPRDCT
 0
 32
   1.002404      4.9244434E-02  0.0000000E+00
  0.9927500      0.1472606      0.0000000E+00


TEST102.PT2:
PT2  Sum-frequency only
-1  1          (diffraction for second-order force for all modes)
1 1 1 1 1 1
1 0
1
```

```
1 2 1
1 1


TEST102.FDF: (first 8 lines only)
TEST102 FDF circular waterline with R=1 and RINNER=3
   3.000000    RINNER
         512         132   NPF NTCL
           2   2.000000          5          10  (NAL,DELR,NCIRE,NGSP)
   0.999988E+00   0.106249E+01   0.105739E+01   0.995187E+00
   0.466689E-05   0.359726E-05   0.104140E+00   0.980131E-01
   0.995187E+00   0.105739E+01   0.104207E+01   0.980770E+00
   0.980131E-01   0.104140E+00   0.207279E+00   0.195085E+00
   .
   .
   .

TEST102.CFG:
 IPLTDAT=1
 ILOWHI=0
 IALTPOT=2
 IRR=1
 ISOLVE=1
 IPERIO=3
 MONITR=0
 NUMHDR=1
 I2ND=1
 IPOTEN=1
 ILOG=1
 NOOUT= 1 1 1 1 0 1 1 1 1  1  1  1  0  1  1  1
 USERID_PATH=\WAMITv6   (directory for *.exe, *.dll, and userid.wam)
 IPNLBPT=2
 ISOR=1

TEST102.BPI:
bpi test102
32
9.9879548E-01 4.9067161E-02 0.00
9.8917650E-01 1.4673052E-01 0.00
9.7003125E-01 2.4298021E-01 0.00
9.4154407E-01 3.3688985E-01 0.00
9.0398918E-01 4.2755533E-01 0.00
8.5772867E-01 5.1410265E-01 0.00
8.0320751E-01 5.9569933E-01 0.00
```

```
7.4095115E-01 6.7155893E-01 0.00
6.7155883E-01 7.4095124E-01 0.00
5.9569929E-01 8.0320755E-01 0.00
5.1410272E-01 8.5772862E-01 0.00
4.2755509E-01 9.0398930E-01 0.00
3.3688994E-01 9.4154404E-01 0.00
2.4297990E-01 9.7003132E-01 0.00
1.4673033E-01 9.8917653E-01 0.00
4.9067438E-02 9.9879547E-01 0.00
-4.9067438E-02 9.9879547E-01 0.00
-1.4673033E-01 9.8917653E-01 0.00
-2.4297990E-01 9.7003132E-01 0.00
-3.3688994E-01 9.4154404E-01 0.00
-4.2755509E-01 9.0398930E-01 0.00
-5.1410272E-01 8.5772862E-01 0.00
-5.9569929E-01 8.0320755E-01 0.00
-6.7155883E-01 7.4095124E-01 0.00
-7.4095115E-01 6.7155893E-01 0.00
-8.0320751E-01 5.9569933E-01 0.00
-8.5772867E-01 5.1410265E-01 0.00
-9.0398918E-01 4.2755533E-01 0.00
-9.4154407E-01 3.3688985E-01 0.00
-9.7003125E-01 2.4298021E-01 0.00
-9.8917650E-01 1.4673052E-01 0.00
-9.9879548E-01 4.9067161E-02 0.00
```

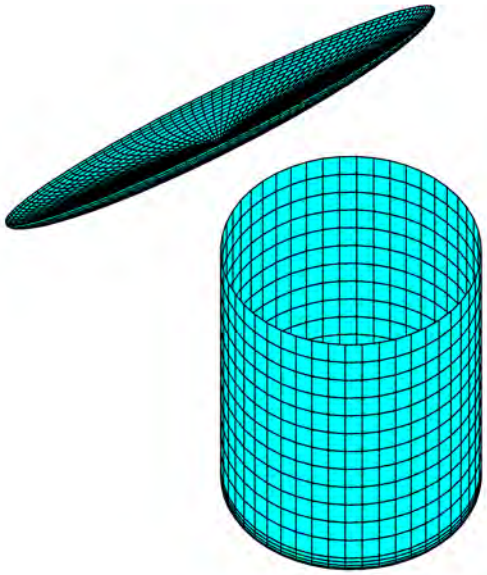
B.3 MULTIPLE BODIES (APPROXIMATION) – TEST103

This test uses the same cylinder and spheroid as in the low-order TEST05.

The cylinder is fixed and the spheroid is free to move in the evaluation of the first order solution. The second-order motion is not considered. The added-mass and damping coefficients, the first-order exciting forces, motions, body pressures, field pressures, wave elevations, and mean drift forces are evaluated in infinite water depth for two wave periods and one wave heading. The second-order forces, wave elevations, body pressures and field pressures are evaluated for all difference frequency pairs.

One quadrant of the cylinder is discretized with 336 panels and one quadrant of the spheroid is discretized with 512 panels.

This test illustrates an option to evaluate an approximate second-order solution by omitting the free surface forcing. The forcing on the body, due to the second-order incident wave and the first-order body motions of the spheroid, is included in the second-order solution.



```
TEST103C.GDF: (first 8 lines only)
TEST103C cylinder R=1 T=2
   1.000000       9.806650
            1           1
          336
  0.9914449      0.1305262      0.0000000E+00
   1.000000      0.0000000E+00  0.0000000E+00
   1.000000      0.0000000E+00 -0.1583333
  0.9914449      0.1305262     -0.1583333
   .
   .

TEST103S.GDF: (first 8 lines only)
TEST103S spheroid  a=2, b=c=0.25
   1.000000       9.806650
            1           1
          512
   1.997591      1.2266919E-02 -1.0927847E-08
   2.000000      0.0000000E+00 -1.0927847E-08
   1.990369      0.0000000E+00 -2.4504296E-02
   1.987972      1.2207850E-02 -2.4504296E-02
   .
   .

TEST103.POT -- Cylinder + spheroid, ILOWHI=0
 -1.
 0           1               IRAD, IDIFF
 2                            NPER (array PER follows)
 8.971402  2.006403
 1                           NBETA (array BETA follows)
 0.
 2                            NBODY
 test103c.gdf
 1.25 0.0 0.0 0.0             XBODY
 0  0  0  0  0  0             IMODE(1-6)
 0                            NEWMDS
 test103s.gdf
 -0.5 0.0 0.0 90.0            XBODY
 1  1  1  1  1  1             IMODE(1-6)
 0                            NEWMDS

TEST103.FRC:
TEST103.FRC -- Cylinder SPHEROID
  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  0
```

```
 1.0
test103c.frc
test103s.frc
 0
 1
 0.0001 0.0001 0.
```

```
TEST103C.FRC:
TESTS 103 and 113 Fixed Cylinder
 0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 0.000000
 1.000000      .0000000      .0000000
 .0000000      1.000000      .0000000
 .0000000      .0000000      1.000000
 0
 0
```

```
TEST103S.FRC:
TESTS 103 and 113 Floating Spheroid
 0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 1.        rho (water density)
 0. 0. 0.  XCG (center of gravity w.r.t. body coordinates)
 1         IMASS (radii of gyration are assumed 1)
 0.257621  0.        0.        0.        0.        0.
 0.        0.257621  0.        0.        0.        0.
 0.        0.        0.257621  0.        0.        0.
 0.        0.        0.        0.257621  0.        0.
 0.        0.        0.        0.        0.257621  0.
 0.        0.        0.        0.        0.        0.257621
 0     IDAMP (if damped change it to 1 and add 6 x 6 damping forces)
 0     ISITF (if restoring force applied change it to 1 and add 6 x 6 elements)
 0
 0
```

```
TEST103.PT2:
TEST103  AND TEST 113 -- PT2
-1  1          (diffraction for second-order force for all modes)
1 1 1 1 1 1
-1  1          (diffraction for second-order force for all modes)
1 1 1 1 1 1
0 2            (all difference frequency pairs)
```

```
TEST103.FDF:
TEST103 -- Free suface forcing not included (NPF,NTCL,NAL=0)
```

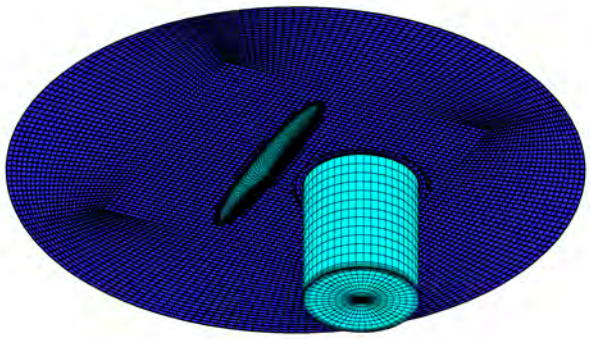
```
   -1.    RINNER (irrelavant because no foricing considered)

TEST103.CFG
 IPLTDAT=1
 MAXSCR=1000
 ILOWHI=0
 ISOR=1
 IALTPOT=2
 IRR=0
 ISOLVE=2
 KSPLIN=3
 IQUADO=3
 IQUADI=4
 IPERIO=1
 NUMHDR=1
 NOOUT=  0  1  1  1  1  1  1  1  1  1  1   1  1  1  1  0
 IALTFRC = 3    !  Alternative Form 3 FRC
 IALTFRCN= 1 2
 I2ND=1
 ILOG=1
 USERID_PATH=\WAMITv6   (directory for *.exe, *.dll, and userid.wam)
 IPNLBPT=-1

TEST103C.BPI
bpi test103c
2
  2.24786E+00  6.54030E-02 -7.91667E-02
  1.31002E+00 -9.15791E-01 -2.00000E+00

TEST103S.BPI
bpi test103s
2
 -5.06206E-01  1.99673E+00 -1.28765E-02
 -4.82491E-01  3.43847E-03 -2.49386E-01
```

B.3A MULTIPLE BODIES – TEST103A

This test run is same as TEST103 except that the free surface forcing is included for complete second-order solutions.

The option for automatic defintion of inner region, inside a circle with radius RINNER=5, is used. The inner region is represented with 7656 panels. The panel vertices are output in test103_new.fdf and test103_pan.dat. Intermediate region is not considered and the partition radius is the same as RINNER.

Perspective view of the body and the inner region of the free surface is shown below.



```
TEST103C.GDF: (first 8 lines only)
TEST103C cylinder R=1 T=2
   1.000000       9.806650
           1            1
         336
  0.9914449      0.1305262      0.0000000E+00
   1.000000      0.0000000E+00  0.0000000E+00
   1.000000      0.0000000E+00 -0.1583333
  0.9914449      0.1305262     -0.1583333

TEST103S.GDF: (first 8 lines only)
TEST103S spheroid  a=2, b=c=0.25
   1.000000       9.806650
           1            1
         512
   1.997591      1.2266919E-02 -1.0927847E-08
   2.000000      0.0000000E+00 -1.0927847E-08
   1.990369      0.0000000E+00 -2.4504296E-02
   1.987972      1.2207850E-02 -2.4504296E-02

TEST103A.POT:
TEST103A.POT -- Cylinder + spheroid, ILOWHI=0
 -1.
 0           1               IRAD, IDIFF
 2                            NPER (array PER follows)
 8.971402  2.006403
 1                           NBETA (array BETA follows)
 0.
 2                            NBODY
 test103c.gdf
 1.25 0.0 0.0 0.0             XBODY
 0  0  0  0  0  0             IMODE(1-6)
 0                            NEWMDS
 test103s.gdf
 -0.5 0.0 0.0 90.0            XBODY
 1  1  1  1  1  1             IMODE(1-6)
 0                            NEWMDS


TEST103A.FRC:
TEST103A.FRC -- Cylinder SPHEROID
  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  0
  1.0
```

```
 test103c.frc
 test103s.frc
  0
  1
  0.0001 0.0001

TEST103C.FRC:
 TESTS 103 and 113 Fixed Cylinder
 0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 0.000000
 1.000000      .0000000      .0000000
 .0000000      1.000000      .0000000
 .0000000      .0000000      1.000000
 0
 0

TEST103S.FRC:
TESTS 103 and 113 Floating Spheroid
 0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 1.        rho (water density)
 0. 0. 0.  XCG (center of grativity w.r.t. body coordinates)
 1         IMASS (radii of gyration are assumed 1)
 0.257621  0.        0.        0.        0.        0.
 0.        0.257621  0.        0.        0.        0.
 0.        0.        0.257621  0.        0.        0.
 0.        0.        0.        0.257621  0.        0.
 0.        0.        0.        0.        0.257621  0.
 0.        0.        0.        0.        0.        0.257621
 0     IDAMP (if damped change it to 1 and add 6 x 6 damping forces)
 0     ISITF (if restoring force applied change it to 1 and add 6 x 6 elements)
 0
 0

TEST103A.PT2:
TEST103A  AND TEST 113A-- PT2
-1  1          (diffraction for second-order force for all modes)
1 1 1 1 1 1
-1  1          (diffraction for second-order force for all modes)
1 1 1 1 1 1
0 2            (all difference frequency pairs)

TEST103A.FDF:
TEST103A   (cylinder and spheroid)
   5.000000    PARTR
```

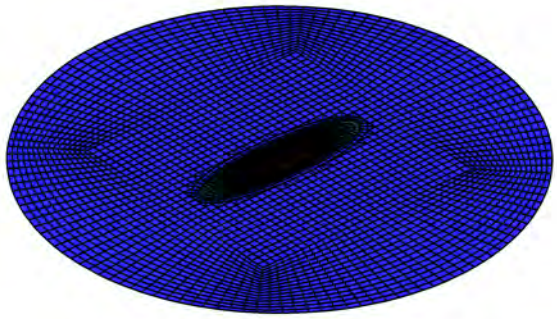
```
        -1     1.0    Automatic FDF, SCALE
   0   0.  0    0  (NAL, DELR, NCIRE, NGSP)

TEST103A.CFG
 IPLTDAT=1
 MAXSCR=1000
 ILOWHI=0
 ISOR=1
 IALTPOT=2
 IRR=0
 ISOLVE=0
 IPERIO=1
 NUMHDR=1
 NOOUT=  0  1  1  1  0  1  1  1  1  1  1   1  0  1  1  0
 IALTFRC = 3    !  Alternative Form 3 FRC
 IALTFRCN= 1 2
 I2ND=1
 ILOG=1
 USERID_PATH=\WAMITv6   (directory for *.exe, *.dll, and userid.wam)
 IPNLBPT=-1

TEST103C.BPI
bpi test103c
2
  2.24786E+00  6.54030E-02 -7.91667E-02
  1.31002E+00 -9.15791E-01 -2.00000E+00

TEST103S.BPI
bpi test103s
2
 -5.06206E-01  1.99673E+00 -1.28765E-02
 -4.82491E-01  3.43847E-03 -2.49386E-01
```

B.4 Ellipsoid with a tank – TEST104

The first-order exciting forces, motions, wave elevations, pressures and fluid velocities at the field points, and mean drift forces are evaluated for a ellipsoid of length 150 meters, beam 40 meters, and draft 15 meters in the water depth of 40 meters. The ellipsoid has an internal tank of 50 meter length, 24 meter width, and 5.5 meter draft. The free surface of the tank is at 5 meters above the exterior free surface. The second-order quadratic forces and complete second-order forces by direct and indirect methods, hydrodynamic pressures on the body and field points, wave elevations, and motions are evaluated for difference frequencies.

Using one plane of symmetry, one half of the elliposid and the tank is discretized into 1408 panels, with 448 panels on the ellipsoid, 448 panels on the interior free surface (IRR=1), and 512 panels on the tank.

The exterior free surface inside the inner circle of radius of 100 meters and on the tank free surface defined automatically. No intermediate region is considered. Perspective view of the body and the inner region of the free surface is shown below.



```
TEST104GDF:
ellipoid with a tank,ILOWHI=0
   75.00000       9.806650
            0           1
         1408
   74.52841       2.239290     -6.5567087E-07
   75.00000      0.0000000E+00 -6.5567087E-07
   74.63885      0.0000000E+00  -1.470258
   74.16954       2.228508      -1.470258
   73.11959       4.450418     -6.5567087E-07
   74.52841       2.239290     -6.5567087E-07
   74.16954       2.228508      -1.470258
   72.76750       4.428988      -1.470258
   .
   .

TEST104.POT:
 test104.pot
 40. 0. 0. 0. 0.   HBOT, XBODY(1:4)
 0           1     IRAD, IDIFF
 1  1  1  1  1  1  IMODE
 -5                NPER
 0.4 0.02          PER(1), Increment
 1                 NBETA
 30.               BETA


TEST104.FRC:
Ellipsoid with a tank (Alternative 1 FRC)
 1    1    1    1    0    1   1    2    2  1 1 1 0 1 1 1
 0.0
 10.00000      0.000000      0.000000
 0.000000      30.000000     0.000000
 0.000000      0.000000      30.00000
 0
 5
 1  0.  0.  5.
 1  0.1  5.  5.
 1 -0.1 -5.  5.
 0  0.1  21.  0.
 0 -0.1 -21.  0.
```

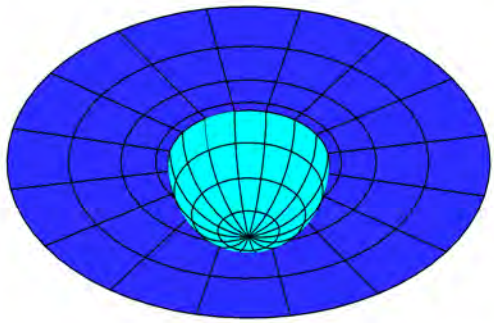
```
TEST104.PT2:
PT2
1  1          IRAD2 IDIF2
1 1 1 1 1 1   IMODE2
0 1           IXSUM, IXDIF
4             NDIFP
1 2 1
1 1
2 3 1
1 1
3 4 1
1 1
4 5 1
1 1    (all difference frequency pairs)

TEST104.FDF:
FDF for spheroial hull L/2=75,B/2=25,D=10 and a tank
   200.0000
         -1         1.
           0  0.0000000E+00           0           0

TEST104.CFG:
IPLTDAT=1
MAXSCR=1024
ILOWHI=0
ISOR=1
ISOLVE=1
ISCATT=0
IQUAD=0
ILOG=1
IDIAG=0
IRR=1
MONITR=0
NUMHDR=1
USERID_PATH=\WAMITv6   (directory for *.exe, *.dll, and userid.wam)
NPTANK=(897-1408)
ITANKFPT=1
RHOTANK=0.8
I2ND=1
IPERIO=2
IPOTEN=1
```

B.11 SPHERE – TEST111

The sphere considered in the low-order TEST101 is analysed using the higher-order method. The first-order exciting forces, motions, body pressures and velocities, wave elevations, field pressures and velocities, drift forces are evaluated for a hemisphere of radius 1 meter, in 3 meters of water depth. In addition, the second-order quadratic forces and complete second-order forces by direct and indirect methods, second-order hydrodynamic pressures on the body and in the fluid, wave elevations, and motions are evaluated for difference frequencies.

Using two planes of symmetry, the first quadrant of of the hemisphere is represented with two patches one patch on the surface of the hemisphere and the other on the interior free surface(IRR=1). Each patch is subdivided into 16 higher-order panels.

In the FDF file, the inner region is specified by a circle of radius 3 meters. A subroutine for an annulus in FDEXACT.F is used to represent the inner region (IFDDEF=-1). The intermediate region consists of two annuli of width 2 meters. On each annulus, $2^5 + 1$ nodes and 10 nodes Gauss quadratures are applied in the azimuthal and radial directions, respectively. Perspective view of the body and the inner region of the free surface is shown below.



TEST111.GDF:

```
sphere
1. 9.80665  ULEN GRAV
1  1        ISX  ISY
2  -3       NPATCH  IGDEF
2
1.0 1.     RADIUS, DRAFT
0          Uniform mapping
```

TEST111.SPL:

```
SPL for a quadrant of a sphere. IRR=1
4  4        NU NV (Patch 1, side   u azimuthal v vertical)
4  4        NU NV (Patch 2, interior free surface  u azimuthal v radial)
```

TEST111.POT

```
POT
 3.
 1           1               IRAD, IDIFF
 2                           NPER (array PER follows)
0.8 1.
 1                           NBETA (array BETA follows)
 0.
 1                           NBODY
 test111.gdf
 0. 0. 0. 0.                 XBODY
 1  1  1  1  1  1            IMODE(1-6
 0                           NEWMDS
```

TEST111.FRC: (first 10 lines)

```
FRC
 0   0   1   1   3   1   1   2   2   1   1   1   1   1   1   1   (IOPTN 1-16)
 0.000000                                VCG
 1.000000      .0000000      .0000000
 .0000000      1.000000      .0000000
 .0000000      .0000000      1.000000        XPRDCT
 0
32
   1.002404      4.9244434E-02  0.0000000E+00
  0.9927500      0.1472606      0.0000000E+00
```

TEST111.PT2:

```
PT2
1  1          (radiation and diffraction for all modes)
```

```
1 1 1 1 1 1
0 1
3
1 1 1
1 1
2 2 1
1 1
1 2 1
1 1
```

TEST111.FDF:

```
FDF for 1/4 of a sphere or vertical cylinder
  3. (RINNER)
       1       16           (NPATCHF, NTCLH)
       2    2      5          10 (NAL DELR NCIRE NGSP)
-1 -1.       (IFDDEF=-1, annulus, SCALE < 0 use _FDF.SPL)
2            (NLINES)
1. 3.        (inner radius, outer radius. The latter should be same as PARTR)
1            (Nonuniform spacing)
```

TEST111.CFG:

```
 IPLTDAT=4
 ILOWGDF=4
 ILOWHI=1
 IALTPOT=2
 IRR=1
 ISOLVE=1
 KSPLIN=3
 IQUADO=3
 IQUADI=4
 IPERIO=3
 MONITR=0
 NUMHDR=1
 I2ND=1
 IPOTEN=1
 ILOG=1
 NOOUT= 1 1 1 1 0 1 1 1 1  1  1  1  0  1  1  1
 USERID_PATH=\WAMITv6   (directory for *.exe, *.dll, and userid.wam)
 ICTRSURF=1
```

B.11A SPHERE – TEST111A

This test is the same as TEST111. But the geometry of the inner region, an annulus between the radii 1 to 3 meters, is described using B-splines to illustrate the use the IFSDEF=1 option. See Section B.11 for additional descriptions of the test.

```
TEST111a.POT
POT
 3.
 1           1               IRAD, IDIFF
 2                            NPER (array PER follows)
0.8 1.
 1                            NBETA (array BETA follows)
 0.
 1                            NBODY
 test111.gdf
 0. 0. 0. 0.                  XBODY
 1  1  1  1  1  1             IMODE(1-6
 0                            NEWMDS

TEST111a.FRC: (first 10 lines)
FRC
 0   0   1   1   3   1   1   2   2   1   1   1   1   1   1   1   (IOPTN 1-16)
 0.000000                                  VCG
 1.000000      .0000000      .0000000
 .0000000      1.000000      .0000000
 .0000000      .0000000      1.000000      XPRDCT
 0
32
   1.002404      4.9244434E-02  0.0000000E+00
  0.9927500      0.1472606      0.0000000E+00

TEST111a.PT2:
PT2
1  1          (radiation and diffraction for all modes)
1 1 1 1 1 1
0 1
3
1 1 1
1 1
2 2 1
1 1
```

```
1 2 1
1 1

TEST111a.FDF: (1st 12 lines)
1 < R < 3
  3. RINNER
       1       32        (NPATCHF=1, NTCLH=32)
       2    2      5         10  (NAL DELA NCIRE NGSP)
       1    -1             (IFDDEF=1 b-splines, SCALE=-1 use _FDF.SPL)
           4           4
           4           4
  -2.000000      -2.000000      -2.000000      -2.000000      -1.000000
  0.0000000E+00   1.000000       2.000000       2.000000       2.000000
   2.000000
  -2.000000      -2.000000      -2.000000      -2.000000      -1.000000
  0.0000000E+00   1.000000       2.000000       2.000000       2.000000


TEST111a.CFG:
 IPLTDAT=4
 ILOWGDF=4
 ILOWHI=1
 IALTPOT=2
 IRR=1
 ISOLVE=1
 KSPLIN=3
 IQUADO=3
 IQUADI=4
 IPERIO=3
 MONITR=0
 NUMHDR=1
 I2ND=1
 IPOTEN=1
 ILOG=1
 NOOUT= 1 1 1 1 0 1 1 1 1  1  1  1  0  1  1  1
 USERID_PATH=\WAMITv6   (directory for *.exe, *.dll, and userid.wam)
 ICTRSURF=1
```

B.11B SPHERE – TEST111B

This test is the same as TEST111, described in Sectio B.11, except that i) a MS2 model for a hemisphere is used in the GDF file (IGDEF=2) and ii) the inner region of the free surface, an annulus between radii 1 and 3 meters, is defined automatically(IFSDEF=2). See Section B.11 for additional descriptions of the test.

```
TEST111b.GDF:
Model SPR  28-Jan-2013  09:18:04
1.000000  9.806650   ULEN, GRAV
1 1   ISX, ISY
0  2  NPATCH  IGDEF
3  NLINES
test111b.ms2
*
0  0  0 Fast/acc  DivMult  Inward_normals

TEST111b.POT
POT
 3.
 1           1               IRAD, IDIFF
 2                            NPER (array PER follows)
0.8 1.
 1                            NBETA (array BETA follows)
 0.
 1                            NBODY
 test111b.gdf
 0. 0. 0. 0.                  XBODY
 1  1  1  1  1  1             IMODE(1-6
 0                            NEWMDS

TEST111b.FRC: (first 10 lines)
FRC
 0   0   1   1   3   1   1   2   2   1   1   1   1   1   1   1   (IOPTN 1-16)
 0.000000                                 VCG
 1.000000      .0000000      .0000000
 .0000000      1.000000      .0000000
 .0000000      .0000000      1.000000        XPRDCT
 0
32
   1.002404      4.9244434E-02  0.0000000E+00
  0.9927500      0.1472606      0.0000000E+00

TEST111b.PT2:
```

```
PT2
1  1          (radiation and diffraction for all modes)
1 1 1 1 1 1
0 1
3
1 1 1
1 1
2 2 1
1 1
1 2 1
1 1
```

TEST111b.FDF:

```
FDF A quadrant of an annulus for a sphere or vertical circular cylinder
  3.  (RINNER)
 -1. 1.    (Automatic FDF, PANEL SIZE)
  2   2   5  10 (NAL DELA NCIRE NGSP
```

TEST111b.CFG:

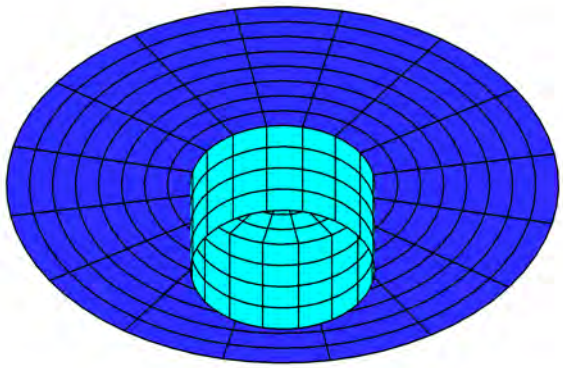
```
 IPLTDAT=4
 ILOWGDF=4
 ILOWHI=1
 IALTPOT=2
 IRR=1
 ISOLVE=1
 KSPLIN=3
 IQUADO=3
 IQUADI=4
 IPERIO=3
 MONITR=0
 NUMHDR=1
 I2ND=1
 IPOTEN=1
 ILOG=1
 NOOUT= 1 1 1 1 0 1 1 1 1  1  1  1  0  1  1  1
 USERID_PATH=\WAMITv6   (directory for *.exe, *.dll, and userid.wam)
 ICTRSURF=1
```

B.12 BOTTOM MOUNTED CYLINDER – TEST112

The first-order quantities including exciting forces, pressures on the body and field points, wave elevations, drift forces are evaluated for a bottom mounted vertical circular cylinder of radius 1 meter and draft 1 meter, in finite water depth of 1 meter. In addition, the second-order quantities including quadratic forces, complete forces by direct and indirect methods, pressures on the body and field points, wave elevations are evaluated for two linear wave periods with same wave heading. Only sum frequency solution is evaluated.

Using two planes of symmetry, the first quadrant of the cylinder is described by a patch. To remove the effect of the irregular frequency, a quarter of the interior free surface described by another patch (IRR=1).

The inner region of the free surface is represented analytically using a subroutine in FDEXACT.F (IFSDEF=-1). The intermediate region consists of two annuli with width of 2 meters. On each annulus, $2^5 + 1$ nodes and 10 nodes Gauss quadratures are applied in the azimuthal and radial directions, respectively.. Perspective view of the body and the inner region of the free surface is shown below.



TEST112.GDF:

```
Bottom mounted cylinder R=1 T=1 -- analytic geometry (npatch=2, IRR=1)
1. 9.80665  ULEN GRAV
1  1         ISX  ISY
2  -1     NPATCH  IGDEF
3
1.0 1.     RADIUS, DRAFT
0          Uniform mapping
1          Bottom mounted cylinder
```

TEST112.SPL:

```
cylinder R=1 T=1. -- analytic geometry (npatch=2)
4  4        NU NV (Patch 1, side   u azimuthal v vertical)
4  4       Interior free surface for IRR=1
```

TEST112.POT:

```
POT  for test112.gdf
 1.
-1           1               IRAD, IDIFF
 2                            NPER (array PER follows)
1.4 1.6
 1                            NBETA (array BETA follows)
 0.
 1                            NBODY
 test112.gdf
 0. 0. 0. 0.                  XBODY
 1  1  1  1  1  1             IMODE(1-6)
 0                            NEWMDS
```

TEST112.FRC: (first 10 lines)

```
Bottom mounted Cylinder of radius 1
 0   0   1   0   3   1   1   2   2   1   1   1   1   1   1   0   (IOPTN 1-16)
 0.000000                                    VCG
 1.000000      .0000000      .0000000
 .0000000      1.000000      .0000000
 .0000000      .0000000      1.000000        XPRDCT
 0
 32
   1.002404      4.9244434E-02  0.0000000E+00
  0.9927500      0.1472606      0.0000000E+00
```

```
TEST112.PT2:
PT2  Sum-frequency
-1  1          (diffraction for second-order force for all modes)
1 1 1 1 1 1
1 0
1
1 2 1
1 1


TEST112.FDF: (first 10 lines)
B-spline FDF for circular waterline and 1 < R < 3
  3.  (RINNER)
       1       33  (NPATCHF NTCLH)
       2    2         5         10  (NAL DELR NCIRE NGSP)
       1    -1                     (IFDDEF=1, SCALE=-1 use _FDF.SPL)
           4           4
           4           4
  -2.000000      -2.000000      -2.000000      -2.000000      -1.000000
  0.0000000E+00   1.000000       2.000000       2.000000       2.000000
   2.000000


TEST112.CFG:
 IPLTDAT=4
 ILOWGDF=4
 ILOWHI=1
 IALTPOT=2
 IRR=1
 ISOLVE=1
 KSPLIN=3
 IQUADO=3
 IQUADI=4
 IPERIO=3
 MONITR=0
 NUMHDR=1
 I2ND=1
 IPOTEN=1
 ILOG=1
 NOOUT= 1 1 1 1 0 1 1 1 1  1  1  1  0  1  1  1
 USERID_PATH=\WAMITv6   (directory for *.exe, *.dll, and userid.wam)
 IPNLBPT=2

TEST112.BPI:
```

```
test112 bpi
32
9.9879548E-01 4.9067161E-02 0.00
9.8917650E-01 1.4673052E-01 0.00
9.7003125E-01 2.4298021E-01 0.00
9.4154407E-01 3.3688985E-01 0.00
9.0398918E-01 4.2755533E-01 0.00
8.5772867E-01 5.1410265E-01 0.00
8.0320751E-01 5.9569933E-01 0.00
7.4095115E-01 6.7155893E-01 0.00
6.7155883E-01 7.4095124E-01 0.00
5.9569929E-01 8.0320755E-01 0.00
5.1410272E-01 8.5772862E-01 0.00
4.2755509E-01 9.0398930E-01 0.00
3.3688994E-01 9.4154404E-01 0.00
2.4297990E-01 9.7003132E-01 0.00
1.4673033E-01 9.8917653E-01 0.00
4.9067438E-02 9.9879547E-01 0.00
-4.9067438E-02 9.9879547E-01 0.00
-1.4673033E-01 9.8917653E-01 0.00
-2.4297990E-01 9.7003132E-01 0.00
-3.3688994E-01 9.4154404E-01 0.00
-4.2755509E-01 9.0398930E-01 0.00
-5.1410272E-01 8.5772862E-01 0.00
-5.9569929E-01 8.0320755E-01 0.00
-6.7155883E-01 7.4095124E-01 0.00
-7.4095115E-01 6.7155893E-01 0.00
-8.0320751E-01 5.9569933E-01 0.00
-8.5772867E-01 5.1410265E-01 0.00
-9.0398918E-01 4.2755533E-01 0.00
-9.4154407E-01 3.3688985E-01 0.00
-9.7003125E-01 2.4298021E-01 0.00
-9.8917650E-01 1.4673052E-01 0.00
-9.9879548E-01 4.9067161E-02 0.00
```

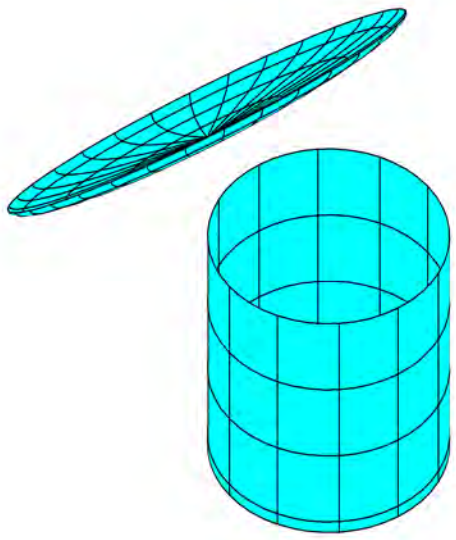
B.13 MULTIPLE BODIES (APPROXIMATION) – TEST113

This test uses the same cylinder and spheroid as in TEST 13 described in Appendix A.

The cylinder is fixed and the spheroid is free to move in the evaluation of the first order solution. The second-order motion is not considered. The added-mass and damping coefficients, the first-order exciting forces, motions, body pressures, field pressures, wave elevations, and mean drift forces are evaluated in infinite water depth for two wave periods and one wave heading. The second-order forces, wave elevations, body pressures and field pressures are evaluated for all difference frequency pairs.

One quadrant of the cylinder is represented with 2 patches and one quadrant of the spheroid is represented by a patch. When NBODY ¿1, the symmetry is not utilized. Thus these patches are reflected about planes of symmetry in WAMIT automatically and the solution on all 8 patches on the cyliner and 4 patches on the spherioid is computed.

This test illustrates an option to evaluate an approximate second-order solution by omitting the free surface forcing. The forcing on the body, due to the second-order incident wave and the first-order body motions of the spheroid, is included in the second-order solution.



```
TEST113C.GDF:
TEST113C cylinder R=1 T=2 -- analytic geometry (npatch=4)
1. 9.80665  ULEN GRAV
1  1        ISX  ISY
4  -13       NPATCH  IGDEF
1           NLINES
1.0 2. 0.1     RADIUS, DRAFT


TEST113S.GDF:
TEST113S spheroid  a=2, b=c=0.25 -- igdef=-4
1. 9.80665  ULEN GRAV
1  1        ISX  ISY
1  -4       NPATCH  IGDEF
1
2.0 0.25 0.25    A, B, C

TEST113.POT:
 TEST113.POT -- Cylinder + spheroid, ILOWHI=1
 -1.
 0           1               IRAD, IDIFF
 2                            NPER (array PER follows)
 8.971402  2.006403
 1                           NBETA (array BETA follows)
 0.
 2                            NBODY
 test113c.gdf
 1.25 0.0 0.0 0.0             XBODY
 0  0  0  0  0  0             IMODE(1-6)
 0                            NEWMDS
 test113s.gdf
 -0.5 0.0 0.0 90.0            XBODY
 1  1  1  1  1  1             IMODE(1-6)
 0                            NEWMDS

TEST113.FRC:
TEST113.FRC -- Cylinder SPHEROID
  1  1  1  1  0  1  1  1  1  1  1  1  1  1  0
  1.0
 test113C.frc
 test113S.frc
  0
  1
```

```
  0.0001 0.0001 0.

TEST113C.FRC:
 TESTS 103 and 113 Fixed Cylinder
 0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 0.000000
 1.000000      .0000000      .0000000
 .0000000      1.000000      .0000000
 .0000000      .0000000      1.000000
 0
 0

TEST113S.FRC:
 TESTS 103 and 113 Floating Spheroid
 0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 1.        rho (water density)
 0. 0. 0.  XCG (center of gravity w.r.t. body coordinates)
 1         IMASS (radii of gyration are assumed 1)
 0.257621  0.        0.        0.        0.        0.
 0.        0.257621  0.        0.        0.        0.
 0.        0.        0.257621  0.        0.        0.
 0.        0.        0.        0.257621  0.        0.
 0.        0.        0.        0.        0.257621  0.
 0.        0.        0.        0.        0.        0.257621
 0     IDAMP (if damped change it to 1 and add 6 x 6 damping forces)
 0     ISITF (if restoring force applied change it to 1 and add 6 x 6 elements)
 0
 0

TEST113.PT2:
TEST103  AND TEST 113 -- PT2
-1  1          (diffraction for second-order force for all modes)
1 1 1 1 1 1
-1  1          (diffraction for second-order force for all modes)
1 1 1 1 1 1
0 2            (all difference frequency pairs)

TEST113.FDF:
TEST113 -- Free suface forcing not included (NPF,NTCL,NAL=0)
   -1.    RINNER (irrelavant because no foricing considered)

TEST113.CFG:
 ILOWGDF=4
 IPLTDAT=4
```

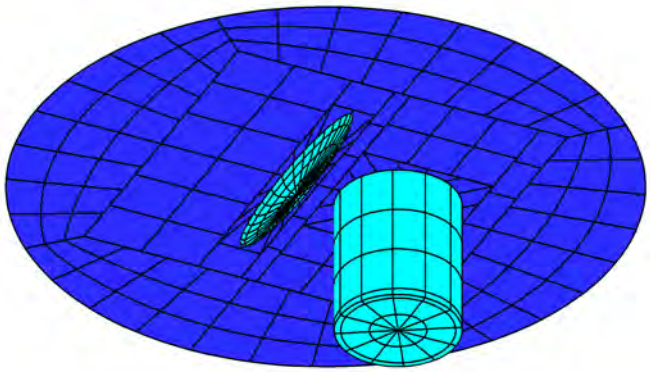
```
 MAXSCR=1000
 ILOWHI=1
 IALTPOT=2
 IRR=0
 ISOLVE=2
 KSPLIN=3
 IQUADO=3
 IQUADI=4
 IPERIO=1
 NUMHDR=1
 NOOUT=  0  1  1  1  0  1  1  1  1  1  1   1  0  1  1  0
 IALTFRC = 3    !  Alternative Form 3 FRC
 IALTFRCN= 1 2
 I2ND=1
 ILOG=1
 USERID_PATH=\WAMITv6   (directory for *.exe, *.dll, and userid.wam)

TEST113C.BPI:
bpi for test113c.gdf
2
  2.24786E+00  6.54030E-02 -7.91667E-02
  1.31002E+00 -9.15791E-01 -2.00000E+00

TEST113S.BPI:
bpi for test113s.gdf
2
 -5.06206E-01  1.99673E+00 -1.28765E-02
 -4.82491E-01  3.43847E-03 -2.49386E-01
```

B.13A MULTIPLE BODIES – TEST113A

This test run is same as TEST113 except that the free surface forcing is included for complete second-order solutions.

The option for automatic defintion of inner region, inside a circle with radius RINNER=5, is used. The inner region is represented with several patches as determined in the program. These patches can be visualized using the date in test113_pan.dat and test113_pat.dat. A corresponding low order form of the FDF file is output in test113_low.fdf, if ILOWGDF ¿ 0 in the CFG file. No intermediate region is considered and the partition radius is the same as RINNER.

Perspective view of the body and the inner region of the free surface is shown below.



```
TEST113C.GDF:
TEST113C cylinder R=1 T=2 -- analytic geometry (npatch=4)
1. 9.80665  ULEN GRAV
1  1        ISX  ISY
4  -13       NPATCH  IGDEF
1           NLINES
1.0 2. 0.1     RADIUS, DRAFT, WIDTH OF CONNER PATCHES


TEST113S.GDF:
TEST113S spheroid  a=2, b=c=0.25 -- igdef=-4
1. 9.80665  ULEN GRAV
1  1        ISX  ISY
1  -4       NPATCH  IGDEF
1
2.0 0.25 0.25    A, B, C

TEST113A.POT:
 TEST113A.POT -- Cylinder + spheroid, ILOWHI=1
 -1.
 0           1               IRAD, IDIFF
 2                            NPER (array PER follows)
 8.971402  2.006403
 1                           NBETA (array BETA follows)
 0.
 2                            NBODY
 test113c.gdf
 1.25 0.0 0.0 0.0             XBODY
 0  0  0  0  0  0             IMODE(1-6)
 0                            NEWMDS
 test113s.gdf
 -0.5 0.0 0.0 90.0            XBODY
 1  1  1  1  1  1             IMODE(1-6)
 0                            NEWMDS

TEST113A.FRC:
TEST113A.FRC -- Cylinder SPHEROID
  1  1  1  1  0  1  1  1  1  1  0  1  0  1  1  0
  1.0
 test113C.frc
 test113S.frc
  0
  1
```

```
  0.0001 0.0001 0.

TEST113C.FRC:
 TESTS 103 and 113 Fixed Cylinder
 0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 0.000000
 1.000000      .0000000      .0000000
 .0000000      1.000000      .0000000
 .0000000      .0000000      1.000000
 0
 0

TEST113S.FRC:
 TESTS 103 and 113 Floating Spheroid
 0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 1.        rho (water density)
 0. 0. 0.  XCG (center of gravity w.r.t. body coordinates)
 1         IMASS (radii of gyration are assumed 1)
 0.257621  0.        0.        0.        0.        0.
 0.        0.257621  0.        0.        0.        0.
 0.        0.        0.257621  0.        0.        0.
 0.        0.        0.        0.257621  0.        0.
 0.        0.        0.        0.        0.257621  0.
 0.        0.        0.        0.        0.        0.257621
 0     IDAMP (if damped change it to 1 and add 6 x 6 damping forces)
 0     ISITF (if restoring force applied change it to 1 and add 6 x 6 elements)
 0
 0

TEST113A.PT2:
TEST103/TEST103A  AND TEST113/TEST113A -- PT2
-1  1          (diffraction for second-order force for all modes)
1 1 1 1 1 1
-1  1          (diffraction for second-order force for all modes)
1 1 1 1 1 1
0 2            (all difference frequency pairs)

TEST113A.FDF:
TEST103A AND 113A -- Free suface forcing not included (NPF,NTCL,NAL=0)
   5.    RINNER
   -1        1    NPATCHF, NTCLH
   0             NAL

TEST113.CFG:
```

```
 ILOWGDF=4
 IPLTDAT=4
 MAXSCR=1000
 ILOWHI=1
 IALTPOT=2
 IRR=0
 ISOLVE=2
 KSPLIN=3
 IQUADO=3
 IQUADI=4
 IPERIO=1
 NUMHDR=1
 NOOUT=  0  1  1  1  0  1  1  1  1  1  1   1  0  1  1  0
 IALTFRC = 3    !  Alternative Form 3 FRC
 IALTFRCN= 1 2
 I2ND=1
 ILOG=1
 USERID_PATH=\WAMITv6   (directory for *.exe, *.dll, and userid.wam)


TEST113C.BPI:
bpi for test113c.gdf
2
  2.24786E+00  6.54030E-02 -7.91667E-02
  1.31002E+00 -9.15791E-01 -2.00000E+00

TEST113S.BPI:
bpi for test113s.gdf
2
 -5.06206E-01  1.99673E+00 -1.28765E-02
 -4.82491E-01  3.43847E-03 -2.49386E-01
```

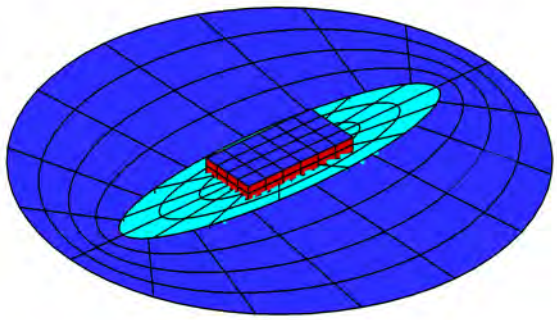
B.14 Ellipsoid with a tank – TEST114

The first-order exciting forces, motions, wave elevations, pressures and fluid velocities at the field points, and mean drift forces are evaluated for a ellipsoid of length 150 meters, beam 40 meters, and draft 15 meters in the water depth of 40 meters. The ellipsoid has an internal tank of 50 meter length, 24 meter width, and 5.5 meter draft. The free surface of the tank is at 5 meters above the exterior free surface. The second-order quadratic forces and complete second-order forces by direct and indirect methods, second-order hydrodynamic pressures on the body and field points, wave elevations, and motions are evaluated for difference frequencies.

Using one plane of symmetry, a half of the body is presented by a patch and a half of the tank by 4 patches. To remove the effect of the irregular frequency, a patch is used on a half of the interior free surface.

The inner region of the free surface is represented analytically using a subroutine in FDEXACT.F (IFSDEF=-3). Intermediate region is not specified and the partition radius is the same as RINNER.

Perspective view of the body and the inner region of the free surface is shown below.



```
TEST114GDF:
ellipoid with a tank
75. 9.80665  ULEN GRAV
0  1        ISX  ISY
6  -23       NPATCH  IGDEF
18           NLINES
75 20 15     long/short/vertical axes
1            NTANK
25.00 0.00 5.00
25.00 12.00 5.00
25.00 12.00 -0.50
25.00 0.00 -0.50
25.00 12.00 5.00
-25.00 12.00 5.00
-25.00 12.00 -0.50
25.00 12.00 -0.50
-25.00 0.00 -0.50
25.00 0.00 -0.50
25.00 12.00 -0.50
-25.00 12.00 -0.50
-25.00 0.00 -0.50
-25.00 12.00 -0.50
-25.00 12.00 5.00
-25.00 0.00 5.00
```

```
TEST114.POT:
 test114.pot
 40. 0. 0. 0. 0.   HBOT, XBODY(1:4)
 0           1     IRAD, IDIFF
 1  1  1  1  1  1  IMODE
 -5                NPER
 0.4 0.02          PER(1), Increment
 1                 NBETA
 30.               BETA
```

```
TEST114.FRC:
Ellipsoid with a tank (Alternative 1 FRC)
 1    1    1    1    0    1   1    2    2  1 1 1 1 1 1 1
 0.0
 10.00000      0.000000      0.000000
 0.000000      30.000000     0.000000
```

```
 0.000000      0.000000      30.00000
 0
 5
 1  0.  0.  5.
 1  0.1  5.  5.
 1 -0.1 -5.  5.
 0  0.1  21.  0.
 0 -0.1 -21.  0.
```

TEST114.PT2:

```
PT2
1  1          IRAD2 IDIF2
1 1 1 1 1 1   IMODE2
0 1           IXSUM, IXDIF
4             NDIFP
1 2 1
1 1
2 3 1
1 1
3 4 1
1 1
4 5 1
1 1    (all difference frequency pairs)
```

TEST114.FDF:

```
FDF for spheroial hull L/2=75,B/2=25,D=10 and a tank
  1.0000E+02      (RINNER)
       2       48  (NPATCHF, NTCLH)
         0         (NAL)
-3 -1              (Analystic, SCALE=-1 Use _FDF.SPL)
4                  (NLines)
75 20 100  Long/Short axes partition radius. The latter should be same as the 2nd lir
0    I90 (Do not Rotate 90 degrees, body coord. is same as global)
1    Ntanks
25 -25 -25 25 12 12 0 0  Tank free surface
```

TEST114.CFG:

```
 ILOWGDF=4
 IPLTDAT=4
 MAXSCR=1024
 ILOWHI=1
 ISOR=0
 ISOLVE=1
```

```
ISCATT=0
IQUAD=0
ILOG=1
IDIAG=0
IRR=1
MONITR=0
NUMHDR=1
USERID_PATH=\WAMITv6   (directory for *.exe, *.dll, and userid.wam)
NPTANK=(3-6)
NPTANKFS=(2-2)
ITANKFPT=1
RHOTANK=0.8
I2ND=1
IPERIO=2
IPOTEN=1
IQUADI=4
IQUADO=3
KSPLIN=3
```