

Table 84 Input data, **egellipse.inp**, for STAGS for the **unstiffened equivalent ellipsoidal shell**. The meridional thickness distribution is listed in **WALLTHICK.STAGS**. (See Table 79). This input is based on **NGCP = 1** and the use of the user-written subroutine, **usrfab.F**. This is the 360-degree elastic-plastic STAGS model shown in the appendix in Fig. a1. The 410 finite element is used. The concentrated load is in the form of uniform pressure applied uniformly over a **single finite element**: the finite element at (LI,LJ) = (Row 1,Column 2) in Shell unit no. 4. This input file, when combined with the proper **egellipse.bin** file, produces deformation such as that displayed in Fig. 166.

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imperfect isogrid-stiffened equivalent ellipsoidal head
 0 0 0 0 0 0 0 $B-1 IGRAV,ICHECK,ILIST,INCBC,NRUNIT,NROTS,KDEV
12 1 0 23 0, $B-2 NUNITS,NUNITE,NSTFS,NINTS,NPATS,
 0 0 0 0 0 0 $B-2 NCONST,NIMPFS,INERT,NINSR,NPATX,NSTIFS
 2 0 0 0 0 1 $B-3 NTAM,NTAB,NTAW,NTAP,NTAMT,NGCP
 5 91, $F-1 NROWS(1),NCOLS(1)
 5 91, $F-1 NROWS(1),NCOLS(1)
 5 91, $F-1 NROWS(1),NCOLS(1)
 5 91, $F-1 NROWS(1),NCOLS(1)
 5 91, $F-1 NROWS(1),NCOLS(1)
 5 91, $F-1 NROWS(1),NCOLS(1)
 5 91, $F-1 NROWS(1),NCOLS(1)
 5 91, $F-1 NROWS(1),NCOLS(1)
 5 91, $F-1 NROWS(1),NCOLS(1)
 5 91, $F-1 NROWS(1),NCOLS(1)
 5 91, $F-1 NROWS(1),NCOLS(1)
 5 91, $F-1 NROWS(1),NCOLS(1)
 5 91, $F-1 NROWS(1),NCOLS(1)
 5 91, $F-1 NROWS(1),NCOLS(1)
 5 91 $F-1 NROWS(2),NCOLS(1)
 1 3 2 1 $G-1 MUNIT,MBOUND,NUNIT,NBOUND
 2 3 3 1 $G-1 MUNIT,MBOUND,NUNIT,NBOUND
 3 3 4 1 $G-1 MUNIT,MBOUND,NUNIT,NBOUND
 4 3 5 1 $G-1 MUNIT,MBOUND,NUNIT,NBOUND
 5 3 6 1 $G-1 MUNIT,MBOUND,NUNIT,NBOUND
 6 3 7 1 $G-1 MUNIT,MBOUND,NUNIT,NBOUND
 7 3 8 1 $G-1 MUNIT,MBOUND,NUNIT,NBOUND
 8 3 9 1 $G-1 MUNIT,MBOUND,NUNIT,NBOUND
 9 3 10 1 $G-1 MUNIT,MBOUND,NUNIT,NBOUND
10 3 11 1 $G-1 MUNIT,MBOUND,NUNIT,NBOUND
11 3 12 1 $G-1 MUNIT,MBOUND,NUNIT,NBOUND
 1 2 1 4 $G-1 unit 1 is a closed shell
 2 2 2 4 $G-1 unit 2 is a closed shell
 3 2 3 4 $G-1 unit 3 is a closed shell
 4 2 4 4 $G-1 unit 4 is a closed shell
 5 2 5 4 $G-1 unit 5 is a closed shell
 6 2 6 4 $G-1 unit 6 is a closed shell
 7 2 7 4 $G-1 unit 2 is a closed shell
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8 2 8 4 $G-1 unit 8 is a closed shell
9 2 9 4 $G-1 unit 9 is a closed shell
10 2 10 4 $G-1 unit10 is a closed shell
11 2 11 4 $G-1 unit11 is a closed shell
12 2 12 4 $G-1 unit12 is a closed shell
-1 -1 $H-1 For pole, rigid links (-1's let computer do the
$ counting for you!)
1 7 1 1 0 0 $I-1 ITAM,NESP,IPLST,ITANST,ICREEP,IPLANE
16.E+06 0.25 0.0 0.16 0.0 16.E+06 0. $I-2 E1,U12,G,RHO,A1,E2,A2
.0075 120000., $I-3 E(i), S(i)
.0088 138000., $I-3 E(i), S(i)
.0102 148000., $I-3 E(i), S(i)
.0122 156000., $I-3 E(i), S(i)
.0156 164000., $I-3 E(i), S(i)
.0200 165000., $I-3 E(i), S(i)
.0400 166000. $I-3 E(i), S(i)
2 7 1 1 0 0 $I-1 ITAM,NESP,IPLST,ITANST,ICREEP,IPLANE
496894.4 .333 0. .004969 496894.4 0. $I-2 E1,U12,G,RHO,A1,E2,A2
.0075 3726.710, $I-3 E(i), S(i)
.0088 4285.710, $I-3 E(i), S(i)
.0102 4596.270, $I-3 E(i), S(i)
.0122 4844.720, $I-3 E(i), S(i)
.0156 5093.170, $I-3 E(i), S(i)
.0200 5124.220, $I-3 E(i), S(i)
.0400 5155.280 $I-3 E(i), S(i)
C
C New section added for GCP records
C
C GCP Material in one or more of shell unit walls
PLASTIC_WB_MATERIAL 1 1 1 2 0 $ I-5a matid,ngroups,nstates.onetwo
16.E+06 0.25 0.16 0.0 7 0. $ I-9a E,GNU,RHO,ALPHA,NSUBS,T
.0075 120000. .0088 138000., $ I-9b strain, stress material 1
.0102 148000. .0122 156000., $ I-9b strain, stress material 1
.0156 164000. .0200 165000., $ I-9b strain, stress material 1
.0400 166000. $ I-9b strain, stress material 1
C
PLASTIC_WB_MATERIAL 2 1 1 2 0 $ I-5a matid,ngroups,nstates.onetwo
496894.4 0.333 0.004969 0. 7 0. $ I-9a E,GNU,RHO,ALPHA,NSUBS,T
.0075 3726.71 .0088 4285.71, $ I-9b strain, stress material 2
.0102 4596.27 .0122 4844.72, $ I-9b strain, stress material 2
.0156 5093.17 .0200 5124.22, $ I-9b strain, stress material 2
.0400 5155.28 $ I-9b strain, stress material 2
C
C shell unit wall props
SHELL_FABRICATION -1 2 1 0 0 $ I-5a fabid,nlayer,ipts,ishr,ism
2 1 $ I-21a MATID(j), j = 1,nlayer
1 5 $ I-21b INTSHL(j), j = 1,nlayer
1.0E-06 0.4 $ I-21c THKSHL(j), j=1,nlayer

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0.0    0.0    $ I-21d ANGSHL(j), j=1,nlayer
C
END      $ I-5a cease (end of GCP input data, all matl,all walls)
C
C unit 1 = the spherical cap
  7  0  0  0  0  1  $M-1 ISHELL,IGLOBE,NROWS,NCOLS,NLAYS,NFABS
  0.00 2.958103 0.0  360.0  49.5 $M-2 PHI1, PHI2, THETA1, THETA2, R
-1  0  0. 0. 0  1  0 $M-5 IWALL,IWIMP,ZETA,ECZ,ILIN,IPLAS,IRAMP
  410
  0  6  6  6  0      $P-1 IBLN(i), i=1,4, IBOND
111 111
  1  0  0  0  0  0  0 $Q-1 NSYS,NICS,NAMS,NUSS,NHINGE,etc.
  1  1  0
-460.  5  3  0  0  0 $Q-3 P,LT,LD,LI,LJ,LAX
  0  0  0  0  0      $R-1 IPRD,IPRR,IPRE,IPRS,IPRP
C unit 2 = toroidal
  8  0  0  0  0  1  $M-1 ISHELL,IGLOBE,NROWS,NCOLS,NLAYS,NFABS
  2.957441 6.69448 0. 360. .08364234 47.890324 $M-2 PH1,PH2,THET1,
                                     $ THET2,Ra,Rb
-1  0  0. 0. 0  1  0 $M-5 IWALL,IWIMP,ZETA,ECZ,ILIN,IPLAS,IRAMP
  410
  6  6  6  6  0      $P-1 IBLN(i), i=1,4, IBOND
  1  0  0  0  0  0  0 $Q-1 NSYS,NICS,NAMS,NUSS,NHINGE,etc.
  1  1  0
-460.  5  3  0  0  0 $Q-3 P,LT,LD,LI,LJ,LAX
  0  0  0  0  0      $R-1 IPRD,IPRR,IPRE,IPRS,IPRP
C unit 3 = toroidal
  8  0  0  0  0  1  $M-1 ISHELL,IGLOBE,NROWS,NCOLS,NLAYS,NFABS
  6.67782 10.67682 0. 360. .4623073 44.752884 $M-2 PH1,PH2,THET1,
                                     $ THET2,Ra,Rb
-1  0  0. 0. 0  1  0 $M-5 IWALL,IWIMP,ZETA,ECZ,ILIN,IPLAS,IRAMP
  410
  6  6  6  6  0      $P-1 IBLN(i), i=1,4, IBOND
  1  0  0  0  0  0  0 $Q-1 NSYS,NICS,NAMS,NUSS,NHINGE,etc.
  1  1  0
-460.  5  3  0  0  0 $Q-3 P,LT,LD,LI,LJ,LAX
  0  0  0  0  0      $R-1 IPRD,IPRR,IPRE,IPRS,IPRP
C unit 4 = toroidal
  8  0  0  0  0  1  $M-1 ISHELL,IGLOBE,NROWS,NCOLS,NLAYS,NFABS
  10.65673 15.12016 0. 360. 1.338907 40.095947 $M-2 PH1,PH2,THET1,
                                     $ THET2,Ra,Rb
-1  0  0. 0. 0  1  0 $M-5 IWALL,IWIMP,ZETA,ECZ,ILIN,IPLAS,IRAMP
  410
  6  6  6  6  0      $P-1 IBLN(i), i=1,4, IBOND
  2  0  0  0  0  0  0 $Q-1 NSYS,NICS,NAMS,NUSS,NHINGE,etc.
  1  1  0
-460.  5  3  0  0  0 $Q-3 P,LT,LD,LI,LJ,LAX
  2  1  0
  $Q-2 ISYS,NN,IFLG

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-1.0  5  3  1  2  0  $Q-3 P,LT,LD,LI,LJ,LAX
  0  0  0  0  0      $R-1 IPRD,IPRR,IPRE,IPRS,IPRP
C unit 5 = toroidal
  8  0  0  0  0  1  $M-1 ISHELL,IGLOBE,NROWS,NCOLS,NLAYS,NFABS
15.08829 20.32144 0. 360. 2.895449 34.199043 $M-2 PH1,PH2,THET1,
                                                $          THET2,Ra,Rb
-1  0  0. 0. 0  1  0 $M-5 IWALL,IWIMP,ZETA,ECZ,ILIN,IPLAS,IRAMP
410
  6  6  6  6  0      $P-1 IBLN(i), i=1,4, IBOND
  1  0  0  0  0  0  0 $Q-1 NSYS,NICS,NAMS,NUSS,NHINGE,etc.
  1  1  0          $Q-2 ISYS,NN,IFLG
-460.  5  3  0  0  0 $Q-3 P,LT,LD,LI,LJ,LAX
  0  0  0  0  0      $R-1 IPRD,IPRR,IPRE,IPRS,IPRP
C unit 6 = toroidal
  8  0  0  0  0  1  $M-1 ISHELL,IGLOBE,NROWS,NCOLS,NLAYS,NFABS
20.26536 26.78145 0. 360. 5.259145 27.465466 $M-2 PH1,PH2,THET1,
                                                $          THET2,Ra,Rb
-1  0  0. 0. 0  1  0 $M-5 IWALL,IWIMP,ZETA,ECZ,ILIN,IPLAS,IRAMP
410
  6  6  6  6  0      $P-1 IBLN(i), i=1,4, IBOND
  1  0  0  0  0  0  0 $Q-1 NSYS,NICS,NAMS,NUSS,NHINGE,etc.
  1  1  0          $Q-2 ISYS,NN,IFLG
-460.  5  3  0  0  0 $Q-3 P,LT,LD,LI,LJ,LAX
  0  0  0  0  0      $R-1 IPRD,IPRR,IPRE,IPRS,IPRP
C unit 7 = toroidal
  8  0  0  0  0  1  $M-1 ISHELL,IGLOBE,NROWS,NCOLS,NLAYS,NFABS
26.79548 32.96853 0. 360. 7.971097 21.436380 $M-2 PH1,PH2,THET1,
                                                $          THET2,Ra,Rb
-1  0  0. 0. 0  1  0 $M-5 IWALL,IWIMP,ZETA,ECZ,ILIN,IPLAS,IRAMP
410
  6  6  6  6  0      $P-1 IBLN(i), i=1,4, IBOND
  1  0  0  0  0  0  0 $Q-1 NSYS,NICS,NAMS,NUSS,NHINGE,etc.
  1  1  0          $Q-2 ISYS,NN,IFLG
-460.  5  3  0  0  0 $Q-3 P,LT,LD,LI,LJ,LAX
  0  0  0  0  0      $R-1 IPRD,IPRR,IPRE,IPRS,IPRP
C unit 8 = toroidal
  8  0  0  0  0  1  $M-1 ISHELL,IGLOBE,NROWS,NCOLS,NLAYS,NFABS
32.94721 39.85107 0. 360. 10.52211 16.758169 $M-2 PH1,PH2,THET1,
                                                $          THET2,Ra,Rb
-1  0  0. 0. 0  1  0 $M-5 IWALL,IWIMP,ZETA,ECZ,ILIN,IPLAS,IRAMP
410
  6  6  6  6  0      $P-1 IBLN(i), i=1,4, IBOND
  1  0  0  0  0  0  0 $Q-1 NSYS,NICS,NAMS,NUSS,NHINGE,etc.
  1  1  0          $Q-2 ISYS,NN,IFLG
-460.  5  3  0  0  0 $Q-3 P,LT,LD,LI,LJ,LAX
  0  0  0  0  0      $R-1 IPRD,IPRR,IPRE,IPRS,IPRP
C unit 9 = toroidal
  8  0  0  0  0  1  $M-1 ISHELL,IGLOBE,NROWS,NCOLS,NLAYS,NFABS

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39.77901 48.82777 0. 360. 13.07984 12.785950 $M-2 PH1,PH2,THET1,
$ THET2,Ra,Rb
-1 0 0. 0. 0 1 0 $M-5 IWALL,IWIMP,ZETA,ECZ,ILIN,IPLAS,IRAMP
410 $N-1 KELT
6 6 6 6 0 $P-1 IBLN(i), i=1,4, IBOND
1 0 0 0 0 0 0 $Q-1 NSYS,NICS,NAMS,NUSS,NHINGE,etc.
1 1 0 $Q-2 ISYS,NN,IFLG
-460. 5 3 0 0 0 $Q-3 P,LT,LD,LI,LJ,LAX
0 0 0 0 0 $R-1 IPRD,IPRR,IPRE,IPRS,IPRP
C unit 10 = toroidal
8 0 0 0 0 1 $M-1 ISHELL,IGLOBE,NROWS,NCOLS,NLAYS,NFABS
48.74254 60.90592 0. 360. 15.55374 9.5117826 $M-2 PH1,PH2,THET1,
$ THET2,Ra,Rb
-1 0 0. 0. 0 1 0 $M-5 IWALL,IWIMP,ZETA,ECZ,ILIN,IPLAS,IRAMP
410 $N-1 KELT
6 6 6 6 0 $P-1 IBLN(i), i=1,4, IBOND
1 0 0 0 0 0 0 $Q-1 NSYS,NICS,NAMS,NUSS,NHINGE,etc.
1 1 0 $Q-2 ISYS,NN,IFLG
-460. 5 3 0 0 0 $Q-3 P,LT,LD,LI,LJ,LAX
0 0 0 0 0 $R-1 IPRD,IPRR,IPRE,IPRS,IPRP
C unit 11 = toroidal
8 0 0 0 0 1 $M-1 ISHELL,IGLOBE,NROWS,NCOLS,NLAYS,NFABS
60.95361 75.15099 0. 360. 17.45365 7.3341379 $M-2 PH1,PH2,THET1,
$ THET2,Ra,Rb
-1 0 0. 0. 0 1 0 $M-5 IWALL,IWIMP,ZETA,ECZ,ILIN,IPLAS,IRAMP
410 $N-1 KELT
6 6 6 6 0 $P-1 IBLN(i), i=1,4, IBOND
1 0 0 0 0 0 0 $Q-1 NSYS,NICS,NAMS,NUSS,NHINGE,etc.
1 1 0 $Q-2 ISYS,NN,IFLG
-460. 5 3 0 0 0 $Q-3 P,LT,LD,LI,LJ,LAX
0 0 0 0 0 $R-1 IPRD,IPRR,IPRE,IPRS,IPRP
C unit 12 = toroidal
8 0 0 0 0 1 $M-1 ISHELL,IGLOBE,NROWS,NCOLS,NLAYS,NFABS
75.3152 89.91051 0.0 360.0 18.40842 6.3415871 $M-2 PH1,PH2,THET1,
$ THET2,Ra,Rb
-1 0 0. 0. 0 1 0 $M-5 IWALL,IWIMP,ZETA,ECZ,ILIN,IPLAS,IRAMP
410 $N-1 KELT
6 6 0 6 0 $P-1 IBLN(i), i=1,4, IBOND
001 000 $P-2 ITRA, IROT (conditions at pole)
1 0 0 0 0 0 0 $Q-1 NSYS,NICS,NAMS,NUSS,NHINGE,etc.
1 1 0 $Q-2 ISYS,NN,IFLG
-460. 5 3 0 0 0 $Q-3 P,LT,LD,LI,LJ,LAX
0 0 0 0 0 $R-1 IPRD,IPRR,IPRE,IPRS,IPRP
$
$ ELEMENT UNIT for RIGID LINKS
$
$ S-1 records...
$USRPT unit row col ignore coords freedoms AUX #defs layer

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1      1      1      1      3*0.          2*111      0      90      0
1      0      0      1      $ Increment variable above by value
END          $ Computer does the counting for you!
$
$ Element records, "command method"
E120_ELEMENTS      $ Ask for rigid link element
$N1 N2 N3 Kelt Ndefs, increment N1,N2,N3. N3 must be unity.
1 2 1 120 89 1 1 0 $ See T1 record. Want 89 elements
1. $ SCALE
END $ Computer did the counting, incrementation
0 $ No loads
0 $ No printed output
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