Table a40 Abridged input file:
soccerball.costheta.usrfab.480.imposedw.inp (soccerball.inp) for the "crude" E480 "soccerball" model with **imposed normal displacements** on row 5 of Shell Units 11 and 12 (along a circumferential line at the junction between shell segments 3 and 4 in Fig. 2). This imposed "line" displacement perhaps simulates impact with a rigid object that produces a dent that varies as -cos(theta) from zero to 90 degrees in the circumferential coordinate direction. This dent more closely resembles the linear buckling modal imperfection with n = 1 circumferential wave (Fig. 179) than does the dent generated from a concentrated (point) load displayed in Fig. 171. A “cos(theta)” residual dent is generally more harmful than a “concentrated load” residual dent of the same amplitude.

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=====================================================================
soccerball model of isogrid-stiffened equivalent ellipsoidal shell
  0  0  0  0  0  0  0   $B-1 IGRAV,ICHECK,ILIST,INCBC,NRUNIT,NROTS,KDEV
  50  0  0  85  0,  $B-2 NUNITS,NUNITE,NSTFS,NINTS,NPATS,
  0  0  0  0  0  0  $B-2 NCONST,NIMPFS,INERT,NINSR,NPATX,NSTIFS
  2  0  1  0  0  1  $B-3 NTAM,NTAB,NTAW,NTAP,NTAMT,NGCP
$ F-1 records...
  5 13,             $F-1 NROWS(1),NCOLS(1)
  5 13,             $F-1 NROWS(1),NCOLS(1)
 13 13,             $F-1 NROWS(1),NCOLS(1)
  5 13,             $F-1 NROWS(1),NCOLS(1)
  5 13,             $F-1 NROWS(1),NCOLS(1)
 13 13,             $F-1 NROWS(1),NCOLS(1)
  5 13,             $F-1 NROWS(1),NCOLS(1)
  5 13,             $F-1 NROWS(1),NCOLS(1)

 (lines skipped to save space. See Table a37 for input data.)

$ Soccerball apex follows (2 x three shell units)...
$ First 90-degree (0 - 90 deg) group of 3 units...
$ Unit 1: Right pie segment
  1  0  0  0  0  0  $M-1 ISHELL,IGLOBE,NROWS,NCOLS,NLAYS,NFABS
  0. 2.958103  0. 45. 49.5  0. 90.
 -1  0  0. 0.  0  1  0 $M-5 IWALL,IWIMP,ZETA,ECZ,ILIN,IPLAS,IRAMP
  480               $N-1 KELT
  6  6  6  4  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

 (lines skipped to save space. See Table a37, except
  finite element type 480 is used here instead of element 410.)
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$ The remainder of the shell follows (2 x 22 shell units)...
C original unit 2 = toroidal, now unit 7
  8  1  0  0  0  0  $M-1 ISHELL,IGLOBE,NROWS,NCOLS,NLAYS,NFABS
  2.957441 6.69448 0. 45. .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
  480               $N-1 KELT
  6  6  6  4  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 original unit 2 = toroidal now unit 8
  8  1  0  0  0  0  $M-1 ISHELL,IGLOBE,NROWS,NCOLS,NLAYS,NFABS
  2.957441 6.69448 45. 90. .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
  480               $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 original unit 2 = toroidal, now unit 9
  8  1  0  0  0  0  $M-1 ISHELL,IGLOBE,NROWS,NCOLS,NLAYS,NFABS
  2.957441 6.69448 90. 135. .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
  480               $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 original unit 2 = toroidal now unit 10
  8  1  0  0  0  0  $M-1 ISHELL,IGLOBE,NROWS,NCOLS,NLAYS,NFABS
  2.957441 6.69448  135. 180. .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
  480               $N-1 KELT
  6  4  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
C original unit 3 = toroidal now unit 11
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  8  1  0  0  0  0  $M-1 ISHELL,IGLOBE,NROWS,NCOLS,NLAYS,NFABS
  6.67782 10.67682 0. 45. .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
  480               $N-1 KELT
  6  6  6  4  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           $Q-2 ISYS,NN,IFLG
 -460.  5  3  0  0  0 $Q-3 P,LT,LD,LI,LJ,LAX
  2  13  0          $Q-2 ISYS,NN,IFLG
 -1.000000  -1  3  5  1  0 $Q-3 P,LT,LD,LI,LJ,LAX
 -0.997859  -1  3  5  2  0 $Q-3 P,LT,LD,LI,LJ,LAX
 -0.991445  -1  3  5  3  0 $Q-3 P,LT,LD,LI,LJ,LAX
 -0.980785  -1  3  5  4  0 $Q-3 P,LT,LD,LI,LJ,LAX
 -0.965926  -1  3  5  5  0 $Q-3 P,LT,LD,LI,LJ,LAX
 -0.946930  -1  3  5  6  0 $Q-3 P,LT,LD,LI,LJ,LAX
 -0.923880  -1  3  5  7  0 $Q-3 P,LT,LD,LI,LJ,LAX
 -0.896873  -1  3  5  8  0 $Q-3 P,LT,LD,LI,LJ,LAX
 -0.866025  -1  3  5  9  0 $Q-3 P,LT,LD,LI,LJ,LAX
 -0.831470  -1  3  5 10  0 $Q-3 P,LT,LD,LI,LJ,LAX
 -0.793353  -1  3  5 11  0 $Q-3 P,LT,LD,LI,LJ,LAX
 -0.751840  -1  3  5 12  0 $Q-3 P,LT,LD,LI,LJ,LAX
 -0.707107  -1  3  5 13  0 $Q-3 P,LT,LD,LI,LJ,LAX
  0  0  0  0  0     $R-1 IPRD,IPRR,IPRE,IPRS,IPRP
C original unit 3 = toroidal now unit 12
  8  1  0  0  0  0  $M-1 ISHELL,IGLOBE,NROWS,NCOLS,NLAYS,NFABS
  6.67782 10.67682 45. 90. .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
  480               $N-1 KELT
  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           $Q-2 ISYS,NN,IFLG
 -460.  5  3  0  0  0 $Q-3 P,LT,LD,LI,LJ,LAX
  2  12  0          $Q-2 ISYS,NN,IFLG
 -0.659346  -1  3  5  2  0 $Q-3 P,LT,LD,LI,LJ,LAX
 -0.608761  -1  3  5  3  0 $Q-3 P,LT,LD,LI,LJ,LAX
 -0.555570  -1  3  5  4  0 $Q-3 P,LT,LD,LI,LJ,LAX
 -0.500000  -1  3  5  5  0 $Q-3 P,LT,LD,LI,LJ,LAX
 -0.442289  -1  3  5  6  0 $Q-3 P,LT,LD,LI,LJ,LAX
 -0.382683  -1  3  5  7  0 $Q-3 P,LT,LD,LI,LJ,LAX
 -0.321439  -1  3  5  8  0 $Q-3 P,LT,LD,LI,LJ,LAX
 -0.258819  -1  3  5  9  0 $Q-3 P,LT,LD,LI,LJ,LAX
 -0.195090  -1  3  5 10  0 $Q-3 P,LT,LD,LI,LJ,LAX
 -0.130526  -1  3  5 11  0 $Q-3 P,LT,LD,LI,LJ,LAX
 -0.0654031 -1  3  5 12  0 $Q-3 P,LT,LD,LI,LJ,LAX
 -0.000000  -1  3  5 13  0 $Q-3 P,LT,LD,LI,LJ,LAX
  0  0  0  0  0     $R-1 IPRD,IPRR,IPRE,IPRS,IPRP
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```
C original unit 3 = toroidal now unit 13
  8  1  0  0  0  0  $M-1 ISHELL,IGLOBE,NROWS,NCOLS,NLAYS,NFABS
  6.67782 10.67682 90. 135. .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
  480               $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 original unit 3 = toroidal now unit 14
  8  1  0  0  0  0  $M-1 ISHELL,IGLOBE,NROWS,NCOLS,NLAYS,NFABS
  6.67782 10.67682  135. 180. .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
  480               $N-1 KELT
  6  4  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
C original unit 4 = toroidal now unit 15
  8  1  0  0  0  0  $M-1 ISHELL,IGLOBE,NROWS,NCOLS,NLAYS,NFABS
  10.65673 15.12016 0. 45. 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
  480               $N-1 KELT
  6  6  6  4  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 original unit 4 = toroidal now unit 16
  8  1  0  0  0  0  $M-1 ISHELL,IGLOBE,NROWS,NCOLS,NLAYS,NFABS
  10.65673 15.12016 45. 90. 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
  480               $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 original unit 4 = toroidal now unit 17
  8  1  0  0  0  0  $M-1 ISHELL,IGLOBE,NROWS,NCOLS,NLAYS,NFABS
  10.65673 15.12016 90. 135. 1.338907 40.095947 $M-2 PH1,PH2,THET1,
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```
                                                    $    THET2,Ra,Rb
 -1  0  0. 0. 0  1  0 $M-5 IWALL,IWIMP,ZETA,ECZ,ILIN,IPLAS,IRAMP
  480               $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 original unit 4 = toroidal now unit 18
  8  1  0  0  0  0  $M-1 ISHELL,IGLOBE,NROWS,NCOLS,NLAYS,NFABS
  10.65673 15.12016  135. 180. 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
  480               $N-1 KELT
  6  4  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

 (The remainder of the input file, *.inp, is omitted to save space.
  See Table a37, except here we are using the 480 finite element.)
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