Table 30 Analyses performed in **SUBROUTINE STRUCT** for generation of the behavioral design constraints. This list is abstracted from the file, **eqellipse.OPM**, which presents results for the optimized isogrid-stiffened equivalent ellipsoidal shell: the design identified by the heading, "**isogrid-stiffened, imperfect**" in Table 33. The complete eqellipse.OPM file, called "eqellipse.stiffened.opm4", is listed in Table a19 of the appendix. "**eqellipse**" is the "end" user's **specific name** for the case that is a member of the **generic class** called by the GENOPT user: "**equivellipse**".

```
==========================================================================
 ============ Analysis No. 1 for Load Set No. 1 ============
 **** Start linear axisymmetric bifurcation buckling of perfect shell.
 **** The purpose is to get two axisymmetric buckling modal
 **** imperfection shapes: mode 1 and mode 2.
 BIGBOSOR4 input file for linear buckling,perfect shell=
 eqellipse.ALL1
 Input file for SUBROUTINE WALL for STAGS models=
 eqellipse.STAGS
 Linear buckling eigenvalues from BIGBOSOR4, EGV(i)=
  2.8386E+03  3.5262E+03  4.1902E+03  4.3751E+03  5.8141E+03
  6.9852E+03  9.0675E+03  1.0883E+04  1.2440E+04  1.3618E+04
 Linear axisymmetric buckling pressure of perfect shell=  1.3057E+03
 Buckling modal normal displacement w at apex of shell,=  1.0000E+00


 ============ Analysis No. 2 for Load Set No. 1 ============
 *** Start nonlinear axisymmetric stress,+(mode 1) imperfection
 BIGBOSOR4 input file for nonlinear stress,+(mode 1) imperfect=
 eqellipse.ALL2P

 The following quantities are used to generate
 behavioral constraint conditions and margins:
 Region 1 skin buckling load factor,        bskin1=  2.6863E+00
 Region 1 stiffener buckling load factor,   bstif1=  2.9187E+00
 Region 1 skin maximum effective stress,    sknmx1=  8.9086E+04
 Region 1 stiffener max. effective stress,  stfmx1=  8.6190E+04
 Region 2 skin buckling load factor,        bskin2=  2.6893E+00
 Region 2 stiffener buckling load factor,   bstif2=  1.5813E+00
 Region 2 skin maximum effective stress,    sknmx2=  1.0543E+05
 Region 2 stiffener max. effective stress,  stfmx2=  1.2476E+05
 Normal displacement of shell at apex,       ENDUV=  2.8842E-01


 ============ Analysis No. 3 for Load Set No. 1 ============
 *** Start nonlinear axisymmetric stress,+(mode 2) imperfection
 BIGBOSOR4 input file for nonlinear stress,+(mode 2) imperfect=
 eqellipse.ALL4P

 The following quantities are used to generate
 behavioral constraint conditions and margins:
 Region 1 skin buckling load factor,        bskin1=  2.9925E+00
 Region 1 stiffener buckling load factor,   bstif1=  1.8143E+00
 Region 1 skin maximum effective stress,    sknmx1=  8.3974E+04
```

Region 1 stiffener max. effective stress, stfmx1= 1.2255E+05
Region 2 skin buckling load factor, bskin2= 3.1488E+00
Region 2 stiffener buckling load factor, bstif2= 1.7200E+00
Region 2 skin maximum effective stress, sknmx2= 1.1438E+05
Region 2 stiffener max. effective stress, stfmx2= 1.2331E+05
Normal displacement of shell at apex, ENDUV= 3.1743E-01

========== **Analysis No. 4 for Load Set No. 1** ==========
** Start nonlinear axisymmetric collpse,+(mode 1) imperfection
BIGBOSOR4 input file, axisymmetric collpse, +mode 1 imperfect=
eqellipse.ALL6P

Pressure multiplier, P, for all load steps=
 4.6000E+01 9.2000E+01 1.3800E+02 1.8400E+02 2.3000E+02
 2.7600E+02 3.2200E+02 3.6800E+02 4.1400E+02 4.6000E+02
 5.0600E+02 5.5200E+02 5.9800E+02 6.4400E+02 6.9000E+02
 7.3600E+02 7.8200E+02 8.2800E+02 8.3260E+02 8.3720E+02
 8.4180E+02 8.4640E+02 8.5100E+02 8.5560E+02 8.6020E+02
 8.6480E+02 8.6940E+02 8.7400E+02 8.7860E+02 8.8320E+02
 8.8780E+02 8.8826E+02 8.8872E+02 8.8918E+02 8.8964E+02
 8.9010E+02 8.9056E+02 8.9102E+02 8.9148E+02

Collapse pressure with +(mode 1): PSTEP(ISTEP)= 8.9148E+02

The following quantity is used to generate the
behavioral constraint condition and margin:
Collapse pressure with mode 1: CLAPS1(ILOADX)= 8.9148E+02

========== **Analysis No. 5 for Load Set No. 1** ==========
** Start nonlinear axisymmetric collpse,+(mode 2) imperfection
BIGBOSOR4 input file, axisymmetric collpse, +mode 2 imperfect=
eqellipse.ALL7P

Pressure multiplier, P, for all load steps=
 4.6000E+01 9.2000E+01 1.3800E+02 1.8400E+02 2.3000E+02
 2.7600E+02 3.2200E+02 3.6800E+02 4.1400E+02 4.6000E+02
 5.0600E+02 5.5200E+02 5.9800E+02 6.4400E+02 6.9000E+02
 7.3600E+02 7.8200E+02 8.2800E+02 8.7400E+02 9.2000E+02

Collapse pressure with +(mode 2): PSTEP(ISTEP)= 9.2000E+02

The following quantity is used to generate the
behavioral constraint condition and margin:
Collapse pressure with mode 2: CLAPS2(ILOADX)= 9.2000E+02

========== **Analysis No. 6 for Load Set No. 1** ==========
** Start nonlinear bifurcation buckling,+(mode 1) imperfection
BIGBOSOR4 input file, bifurcation buckling, +(mode 1) imperf.=
eqellipse.ALL8P

Overall buckling, +(mode 1) imperfection shape;

```
 Applied pressure, PMAX =  4.6000E+02
 Nonlinear bifurcation buckling pressure,
                                    BUCPRSP(circ.waves)=1.1908E+03(2)
 General bifurcation buckling load factor, GENBK1(ILOADX)=2.5888E+00


 ============ Analysis No. 7 for Load Set No. 1 ============
 ** Start nonlinear bifurcation buckling,+(mode 2) imperfection
 BIGBOSOR4 input file, bifurcation buckling, +(mode 2) imperf.=
 eqellipse.ALL9P

 Overall buckling, +(mode 2) imperfection shape;
 Applied pressure, PMAX =  4.6000E+02
 Nonlinear bifurcation buckling pressure,
                                    BUCPRSP(circ.waves)=1.2336E+03(2)
 General bifurcation buckling load factor, GENBK2(ILOADX)=2.6818E+00
==================================================================
```

TO BE ESPECIALLY NOTED: The file names in bold face, such as **eqellipse.ALL1** (in general ***.ALL***) are valid input files for BIGBOSOR4 (or BOSOR4). Any of these ***.ALL*** files can be used as input to BIGBOSOR4 (or BOSOR4) in independent BIGBOSOR4 executions to produce results corresponding to the type of analysis under which they were created. For example, **after completion of a GENOPT mainprocessor run (command = "OPTIMIZE" and only with analysis type, ITYPE = 2 in the *.OPT file),** corresponding to Analysis No. 1 the user can copy the **eqellipse.ALL1** file from the directory where the user is running GENOPT to a different directory where he or she wants to run BIGBOSOR4 (or BOSOR4), for example:

cp …/genoptcase/**eqellipse.ALL1** …/bigbosor4case/**eqellipse.ALL**

The user then types the commands: **bigbosor4log** and **bigbosorall** with the use of the file, **eqellipse.ALL**, as the input data. In this way one can obtain bigbosor4 type output and plots. The **eqellipse.ALL1** file used in the example just given contains input data for Analysis No. 1 (linear axisymmetric bifurcation buckling of perfect shell). After the execution of **bigbosorall**, one can then type **bosorplot** to obtain plots such as those shown in Figs. 4 and 5. Any of the other ***.ALL*** files works the same way.

The file, **eqellipse.STAGS**, is the same as the **WALLTHICK.STAGS** file, such as that listed in Table a23. WALLTHICK.STAGS must be used as input data for any STAGS models that require the user-written **SUBROUTINE WALL** (Tables a20 – a22) or the user-written **SUBROUTINE USRFAB** (Tables a34 – a36)