Table 14 Output file, try4.OPM, for the optimized design produced by the second execution of SUPEROPT

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n $ Do you want a tutorial session and tutorial output?

0 $ Choose an analysis you DON'T want (1, 2,..), IBEHAV

2 $ NPRINT= output index (0=GOOD, 1=ok, 2=debug, 3=too much)

2 $ Choose type of analysis (1=opt., 2=fixed, 3=sensit.) ITYPE

5 $ How many design iterations in this run (3 to 25)?

n $ Take "shortcuts" for perturbed designs (Y or N)?

1 $ Choose 1 or 2 or 3 or 4 or 5 for IDESIGN

1 $ Choose 1 or 2 or 3 or 4 or 5 for move limits, IMOVE

y $ Do you want default (RATIO=10) for initial move limit jump?

y $ Do you want the default perturbation (dx/x = 0.05)?

n $ Do you want to have dx/x modified by GENOPT?

n $ Do you want to reset total iterations to zero (Type H)?

1 $ Choose IAUTOF= 1 or 2 or 3 or 4 or 5 or 6 to change X(i)

\*\*\*\*\*\*\*\*\*\*\*\* END OF THE try4.OPT FILE \*\*\*\*\*\*\*\*\*\*\*

\*\*\*\*\*\*\*\*\*\*\*\* AUGUST, 2010 VERSION OF GENOPT \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

\*\*\*\*\*\*\*\* BEGINNING OF THE try4.OPM FILE \*\*\*\*\*\*\*\*\*

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* MAIN PROCESSOR \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

The purpose of the mainprocessor, OPTIMIZE, is to perform,

in a batch mode, the work specified by MAINSETUP for the case

called try4. Results are stored in the file try4.OPM.

Please inspect try4.OPM before doing more design iterations.

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STRUCTURAL ANALYSIS FOR DESIGN ITERATION NO. 0:

STRUCTURAL ANALYSIS WITH UNPERTURBED DECISION VARIABLES

VAR. DEC. ESCAPE LINK. LINKED LINKING LOWER CURRENT UPPER DEFINITION

NO. VAR. VAR. VAR. TO CONSTANT BOUND VALUE BOUND

1 Y N N 0 0.00E+00 4.00E+01 5.0000E+01 5.00E+01 height from inner to outer membranes: HEIGHT

2 Y N N 0 0.00E+00 6.30E+00 6.3210E+00 8.00E+00 radius of curvature of inner membrane: RINNER

3 Y N N 0 0.00E+00 9.10E+00 1.0580E+01 1.10E+01 radius of curvature of outer membrane: ROUTER

4 Y Y N 0 0.00E+00 3.00E-02 5.7210E-02 3.00E-01 thickness of the inner curved membrane: TINNER

5 Y Y N 0 0.00E+00 3.00E-02 6.2790E-02 3.00E-01 thickness of the outer curved membrane: TOUTER

6 Y Y N 0 0.00E+00 3.00E-02 1.2250E-01 3.00E-01 thickness of inner truss-core segment: TFINNR

7 Y Y N 0 0.00E+00 3.00E-02 5.7920E-02 3.00E-01 thickness of the outer truss segment: TFOUTR

8 Y Y N 0 0.00E+00 3.00E-02 4.5620E-02 3.00E-01 thickness of each truss-core web: TFWEBS

BEHAVIOR FOR 1 ENVIRONMENT (LOAD SET)

CONSTRAINT BEHAVIOR DEFINITION

NUMBER VALUE

BEHAVIOR FOR LOAD SET NUMBER, ILOADX= 1

BIGBOSOR4 input file for: general buckling load

try4.BEHX1

Changes in temperature required to create 2 total axial loads:

1. Change in temperature required to create the axial thermal

strain that generates the axial tension due to closing the

two ends of the pressurized volume (PMIDDL= 6.0000E+01)

between the inner and outer walls of the balloon in

Load Step No. 1: DELTAT= -9.9623E+01

2. Change in temperature required to simulate the Poisson

axial expansion caused by the application of the outer

pressure, POUTER = 5.0000E+00 in Load Step No. 2: DELT= 0.0000E+00

GENERAL BUCKLING LOAD FACTORS AND MODES (BEHX2)

2.9742E+00( 1)

Critical buckling load factor, GENBUK= 2.9742E+00

Critical number of axial half-waves, NWVCRT= 1

Differences in the resultants along the axis of the prismatic

balloon for each segment, J, of the first module:

[N2VAR(J) for the total load] - [N2FIX(J) for the fixed load]=

N2DIFF(J),J=1,6)= -6.5655E+01 -1.9968E+01 -1.8378E+02 -1.1819E+00 -1.0860E+01 -1.0826E+01

N2VAR(J) (total load) are the resultants from Load Step No. 2.

N2FIX(J) (fixed load) are the resultants from Load Step No. 1.

NOTE: The stresses used as behavioral constraints are

computed from N2VAR(J)/thickness(J). These stresses are

lower than those computed from N2FIX(J)/thickness(J).

PREBUCKLING STRESS RESULTANTS IN THE FIRST MODULE

"fixed" from Load Step No. 1 total from Load Step No. 2

Seg.J Node I N1FIX(I,J) N2FIX(I,J) N1VAR(I,J) N2VAR(I,J)

1 1 7.9503E+02 4.8957E+02 5.7618E+02 4.2391E+02

2 1 6.6087E+02 4.7043E+02 5.9431E+02 4.5046E+02

3 1 1.8187E+03 1.0766E+03 1.2060E+03 8.9280E+02

4 1 3.8914E+02 3.6472E+02 3.8520E+02 3.6354E+02

5 1 4.9059E+02 3.4492E+02 4.5439E+02 3.3406E+02

6 1 4.9013E+02 3.4478E+02 4.5405E+02 3.3396E+02

PREBUCKLING MEMBRANE STRESSES IN THE FIRST MODULE COMPUTED FROM

N1FIX/thickness, N2FIX/thickness, N1VAR/thickness, N2VAR/thickness:

"fixed" from Load Step No. 1 total from Load Step No. 2

Seg.J Node I STRS1F(I,J) STRS2F(I,J) STRS1V(I,J) STRS2V(I,J)

1 1 1.3726E+04 8.4525E+03 9.9479E+03 7.3190E+03

2 1 1.0525E+04 7.4921E+03 9.4651E+03 7.1741E+03

3 1 1.4846E+04 8.7885E+03 9.8453E+03 7.2882E+03

4 1 6.8019E+03 6.3752E+03 6.7330E+03 6.3545E+03

5 1 1.0754E+04 7.5607E+03 9.9602E+03 7.3227E+03

Behavior number, General buckling load factor:

Newton iterations required to solve the nonlinear

axisymmetric pre-buckling equilibrium state for the

"fixed" loads (PINNER, PMIDDL, DELTAT): ITER= 5

Newton iterations required to solve the nonlinear

axisymmetric pre-buckling equilibrium state for the

total loads (PINNER, PMIDDL, DELTAT, POUTER): ITER= 2

1 2.974184 general buckling load factor: GENBUK(1 )

BEHAVIOR OVER J = stress component number

2 9465.080 stress component in material 1: STRM1(1 ,1 )

3 0.1000000E-09 stress component in material 1: STRM1(1 ,2 )

4 7174.125 stress component in material 1: STRM1(1 ,3 )

5 0.1000000E-09 stress component in material 1: STRM1(1 ,4 )

6 0.1000000E-09 stress component in material 1: STRM1(1 ,5 )

BEHAVIOR OVER J = stress component number

7 9947.891 stress component in material 2: STRM2(1 ,1 )

8 0.1000000E-09 stress component in material 2: STRM2(1 ,2 )

9 7318.969 stress component in material 2: STRM2(1 ,3 )

10 0.1000000E-09 stress component in material 2: STRM2(1 ,4 )

11 0.1000000E-09 stress component in material 2: STRM2(1 ,5 )

BEHAVIOR OVER J = stress component number

12 9960.242 stress component in material 3: STRM3(1 ,1 )

13 0.1000000E-09 stress component in material 3: STRM3(1 ,2 )

14 7322.674 stress component in material 3: STRM3(1 ,3 )

15 0.1000000E-09 stress component in material 3: STRM3(1 ,4 )

16 0.1000000E-09 stress component in material 3: STRM3(1 ,5 )

\*\*\*\*\* RESULTS FOR LOAD SET NO. 1 \*\*\*\*\*\*

PARAMETERS WHICH DESCRIBE BEHAVIOR (e.g. stress, buckling load)

BEH. CURRENT

NO. VALUE DEFINITION

1 2.974E+00 general buckling load factor: GENBUK(1 )

2 9.465E+03 stress component in material 1: STRM1(1 ,1 )

3 1.000E-10 stress component in material 1: STRM1(1 ,2 )

4 7.174E+03 stress component in material 1: STRM1(1 ,3 )

5 1.000E-10 stress component in material 1: STRM1(1 ,4 )

6 1.000E-10 stress component in material 1: STRM1(1 ,5 )

7 9.948E+03 stress component in material 2: STRM2(1 ,1 )

8 1.000E-10 stress component in material 2: STRM2(1 ,2 )

9 7.319E+03 stress component in material 2: STRM2(1 ,3 )

10 1.000E-10 stress component in material 2: STRM2(1 ,4 )

11 1.000E-10 stress component in material 2: STRM2(1 ,5 )

12 9.960E+03 stress component in material 3: STRM3(1 ,1 )

13 1.000E-10 stress component in material 3: STRM3(1 ,2 )

14 7.323E+03 stress component in material 3: STRM3(1 ,3 )

15 1.000E-10 stress component in material 3: STRM3(1 ,4 )

16 1.000E-10 stress component in material 3: STRM3(1 ,5 )

\*\*\*\*\*\*\* NOTE \*\*\*\*\*\*\* NOTE \*\*\*\*\*\*\* NOTE \*\*\*\*\*\* NOTE \*\*\*\*\*\*

The phrase, "NOT APPLY", for MARGIN VALUE means that that

particular margin value is exactly zero.

\*\*\* END NOTE \*\*\* END NOTE \*\*\* END NOTE \*\*\* END NOTE \*\*\*\*\*

\*\*\*\*\* RESULTS FOR LOAD SET NO. 1 \*\*\*\*\*\*

MARGINS CORRESPONDING TO CURRENT DESIGN (F.S.= FACTOR OF SAFETY)

MARGIN CURRENT

NO. VALUE DEFINITION

1 -8.605E-03 (GENBUK(1 )/GENBUKA(1 )) / GENBUKF(1 )-1; F.S.= 3.00

2 5.652E-02 (STRM1A(1 ,1 )/STRM1(1 ,1 )) / STRM1F(1 ,1 )-1; F.S.= 1.00

3 3.939E-01 (STRM1A(1 ,3 )/STRM1(1 ,3 )) / STRM1F(1 ,3 )-1; F.S.= 1.00

4 5.238E-03 (STRM2A(1 ,1 )/STRM2(1 ,1 )) / STRM2F(1 ,1 )-1; F.S.= 1.00

5 3.663E-01 (STRM2A(1 ,3 )/STRM2(1 ,3 )) / STRM2F(1 ,3 )-1; F.S.= 1.00

6 3.992E-03 (STRM3A(1 ,1 )/STRM3(1 ,1 )) / STRM3F(1 ,1 )-1; F.S.= 1.00

7 3.656E-01 (STRM3A(1 ,3 )/STRM3(1 ,3 )) / STRM3F(1 ,3 )-1; F.S.= 1.00

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* DESIGN OBJECTIVE \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

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CURRENT VALUE OF THE OBJECTIVE FUNCTION:

VAR. CURRENT

NO. VALUE DEFINITION

1 5.738E+01 weight/length of the balloon: WEIGHT

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\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* DESIGN OBJECTIVE \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

\*\*\*\*\*\*\*\*\*\*\* ALL 1 LOAD CASES PROCESSED \*\*\*\*\*\*\*\*\*\*\*

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