**Table 3 Input file, balloon.INP, for the GENTEXT processor. This file is generated during the interactive GENTEXT session conducted by the GENOPT user. This is where the GENOPT user provides the variable names, one-line definitions, and “help” paragraphs that appear in the balloon.PRO file (Table 2) and that are seen by the end user.**

=========================================================================

5 $ starting prompt index in the file balloon.PRO

5 $ increment for prompt index

0 $ Type of prompt: 0="help" paragraph, 1=one-line prompt

This GENOPT case is for a cylindrical balloon

y $ Are there more lines in the "help" paragraph?

the wall of which is a double-walled sandwich made of cloth.

y $ Are there more lines in the "help" paragraph?

The case was brought to the attention of the author,

y $ Are there more lines in the "help" paragraph?

David Bushnell, by Mike Mayo (650-354-5463) on September 21,

y $ Are there more lines in the "help" paragraph?

1010. In this application, GENOPT works with BIGBOSOR4.

y $ Are there more lines in the "help" paragraph?

The cylindrical "balloon" has inner pressure

y $ Are there more lines in the "help" paragraph?

equal to PINNER, outer pressure equal to POUTER, and

y $ Are there more lines in the "help" paragraph?

pressure inside the double-walled sandwich equal to PMIDDL.

y $ Are there more lines in the "help" paragraph?

PINNER is the lowest pressure, PMIDDL is the highest

y $ Are there more lines in the "help" paragraph?

pressure, and POUTER is higher than PINNER but lower than

y $ Are there more lines in the "help" paragraph?

PMIDDL. PMIDDL must be high enough to provide enough

y $ Are there more lines in the "help" paragraph?

tension in the membrane segments of the "balloon" to

y $ Are there more lines in the "help" paragraph?

prevent buckling under the difference, POUTER - PINNER.

y $ Are there more lines in the "help" paragraph?

Details of the model and results are presented in Ref.[1]:

y $ Are there more lines in the "help" paragraph?

[1] Bushnell, David, "Use of GENOPT and BIGBOSOR4 to obtain

y $ Are there more lines in the "help" paragraph?

optimum designs of a double-walled inflatable cylindrical

y $ Are there more lines in the "help" paragraph?

vacuum chamber", unpublished report dated November, 2010.

y $ Are there more lines in the "help" paragraph?

Although the BIGBOSOR4 computer program is intended for

y $ Are there more lines in the "help" paragraph?

use with axisymmetric shell structures with "finite"

y $ Are there more lines in the "help" paragraph?

bending stiffness, the results obtained from this study of

y $ Are there more lines in the "help" paragraph?

a balloon that consists of "shell" segments that act like

y $ Are there more lines in the "help" paragraph?

membranes with essentially zero bending stiffness seem to

y $ Are there more lines in the "help" paragraph?

be reasonable. It is emphasized that the results presented

y $ Are there more lines in the "help" paragraph?

in [1] should be verified via models of the optimized

y $ Are there more lines in the "help" paragraph?

designs from one or more general-purpose finite element

y $ Are there more lines in the "help" paragraph?

codes such as STAGS or ABAQUS or NASTRAN.

n $ Are there more lines in the "help" paragraph?

1 $ Type of prompt: 0="help" paragraph, 1=one-line prompt

LENGTH $ Name of a variable in the users program (defined below)

2 $ Role of the variable in the users program

2 $ type of variable: 1 =integer, 2 =floating point

n $ Is the variable LENGTH an array?

length of the cylindrical shell

y $ Do you want to include a "help" paragraph?

Use a value of about 6000 inches. It should not

y $ Any more lines in the "help" paragraph?

matter what value you use because buckling (or collapse)

y $ Any more lines in the "help" paragraph?

with N = zero circumferential waves around the circumference

y $ Any more lines in the "help" paragraph?

of the huge torus is expected to be critical as of this

y $ Any more lines in the "help" paragraph?

writing. N = 1 is used instead of N = 0 in order to

y $ Are there more lines in the "help" paragraph?

avoid rigid body "buckling" possible with N = 0.

n $ Any more lines in the "help" paragraph?

y $ Any more variables for role types 1 or 2 ? $10

1 $ Type of prompt: 0="help" paragraph, 1=one-line prompt

RADIUS $ Name of a variable in the users program (defined below)

2 $ Role of the variable in the users program

2 $ type of variable: 1 =integer, 2 =floating point

n $ Is the variable RADIUS an array?

inner radius of the cylindrical balloon

y $ Do you want to include a "help" paragraph?

This is the radius to the points on the inner membranes

y $ Any more lines in the "help" paragraph?

where these "shell" segments are connected to each other.

y $ Any more lines in the "help" paragraph?

See Fig. x of [1].

n $ Any more lines in the "help" paragraph?

y $ Any more variables for role types 1 or 2 ? $15

1 $ Type of prompt: 0="help" paragraph, 1=one-line prompt

NMODUL $ Name of a variable in the users program (defined below)

2 $ Role of the variable in the users program

1 $ type of variable: 1 =integer, 2 =floating point

n $ Is the variable NMODUL an array?

number of modules over 90 degrees

y $ Do you want to include a "help" paragraph?

This is the number of triangular "trusses" with two points

y $ Any more lines in the "help" paragraph?

on the inner membrane and one point on the outer membrane

y $ Any more lines in the "help" paragraph?

over a 90-degree sector of the circumference of the

y $ Any more lines in the "help" paragraph?

cylindrical balloon. See Figs. 2 and 5 of [1]. For the

y $ Any more lines in the "help" paragraph?

configuration in which the webs are radial rather than

y $ Any more lines in the "help" paragraph?

slanted, the number of modules is equal to the number

y $ Any more lines in the "help" paragraph?

of radial webs over 90 degrees of the circumference

y $ Any more lines in the "help" paragraph?

of the cylindrical balloon. See Figs. 1 and 4 of [1].

n $ Any more lines in the "help" paragraph?

y $ Any more variables for role types 1 or 2 ? $20

0 $ Type of prompt: 0="help" paragraph, 1=one-line prompt

Next you will be asked to provide material properties.

y $ Are there more lines in the "help" paragraph?

Three different materials are allowed:

y $ Are there more lines in the "help" paragraph?

1. The material of the outer and inner curved membranes.

y $ Are there more lines in the "help" paragraph?

2. The material of the outer and inner "truss" members

y $ Any more lines in the "help" paragraph?

that run in the circumferential direction.

y $ Are there more lines in the "help" paragraph?

3. The material out of which the "truss" (slanted, Fig.2)

y $ Any more lines in the "help" paragraph?

or radial (Fig. 1) webs are fabricated.

y $ Are there more lines in the "help" paragraph?

The material is orthotropic with the following properties:

y $ Are there more lines in the "help" paragraph?

EMOD1 = modulus in the meridional direction, that is,

y $ Any more lines in the "help" paragraph?

in the direction along the arc of each shell segment in

y $ Any more lines in the "help" paragraph?

the plane of the cross section of the complex wall

y $ Any more lines in the "help" paragraph?

of the balloon.

y $ Are there more lines in the "help" paragraph?

EMOD2 = modulus in the circumferential direction of the

y $ Are there more lines in the "help" paragraph?

huge torus, that is, the modulus along the axis of the

y $ Are there more lines in the "help" paragraph?

prismatic shell.

y $ Are there more lines in the "help" paragraph?

G12 = in-plane shear modulus, that is, in the plane of

y $ Any more lines in the "help" paragraph?

the wall of a "shell" segment

y $ Are there more lines in the "help" paragraph?

G13 = out-of plane shear modulus (not used, input required)

y $ Are there more lines in the "help" paragraph?

G23 = out-of-plane shear mdoulus (not used, input required)

y $ Are there more lines in the "help" paragraph?

NU = Poisson ratio

y $ Are there more lines in the "help" paragraph?

ALPHA1 = coefficient of thermal expansion in the meridional

y $ Are there more lines in the "help" paragraph?

direction

y $ Are there more lines in the "help" paragraph?

ALPHA2 = coefficient of thermal expansion in the

y $ Are there more lines in the "help" paragraph?

circumferential direction (prismatic axial direction)

y $ Are there more lines in the "help" paragraph?

TEMPER = temperature difference from the temperature at

y $ Are there more lines in the "help" paragraph?

which the balloon was fabricated (not used, input required)

y $ Are there more lines in the "help" paragraph?

DENSTY = weight density of the material

y $ Are there more lines in the "help" paragraph?

(Aluminum = 0.1 lb/in^3)

n $ Are there more lines in the "help" paragraph?

1 $ Type of prompt: 0="help" paragraph, 1=one-line prompt

EMOD1 $ Name of a variable in the users program (defined below)

2 $ Role of the variable in the users program

2 $ type of variable: 1 =integer, 2 =floating point

y $ Is the variable EMOD1 an array?

y $ Do you want to establish new dimensions for EMOD1 ?

1 $ Number of dimensions in the array, EMOD1

material number

10 $ Max. allowable number of rows NROWS in the array, EMOD1

elastic modulus, meridional direction

n $ Do you want to include a "help" paragraph?

y $ Any more variables for role types 1 or 2 ? $35

1 $ Type of prompt: 0="help" paragraph, 1=one-line prompt

EMOD2 $ Name of a variable in the users program (defined below)

2 $ Role of the variable in the users program

2 $ type of variable: 1 =integer, 2 =floating point

y $ Is the variable EMOD2 an array?

n $ Do you want to establish new dimensions for EMOD2 ?

elastic modulus, circumferential direction

n $ Do you want to include a "help" paragraph?

y $ Any more variables for role types 1 or 2 ? $40

1 $ Type of prompt: 0="help" paragraph, 1=one-line prompt

G12 $ Name of a variable in the users program (defined below)

2 $ Role of the variable in the users program

2 $ type of variable: 1 =integer, 2 =floating point

y $ Is the variable G12 an array?

n $ Do you want to establish new dimensions for G12 ?

in-plane shear modulus

n $ Do you want to include a "help" paragraph?

y $ Any more variables for role types 1 or 2 ? $45

1 $ Type of prompt: 0="help" paragraph, 1=one-line prompt

G13 $ Name of a variable in the users program (defined below)

2 $ Role of the variable in the users program

2 $ type of variable: 1 =integer, 2 =floating point

y $ Is the variable G13 an array?

n $ Do you want to establish new dimensions for G13 ?

out-of-plane (s,z) shear modulus

n $ Do you want to include a "help" paragraph?

y $ Any more variables for role types 1 or 2 ? $50

1 $ Type of prompt: 0="help" paragraph, 1=one-line prompt

G23 $ Name of a variable in the users program (defined below)

2 $ Role of the variable in the users program

2 $ type of variable: 1 =integer, 2 =floating point

y $ Is the variable G23 an array?

n $ Do you want to establish new dimensions for G23 ?

out-of-plane (y,z) shear modulus

n $ Do you want to include a "help" paragraph?

y $ Any more variables for role types 1 or 2 ? $55

1 $ Type of prompt: 0="help" paragraph, 1=one-line prompt

NU $ Name of a variable in the users program (defined below)

2 $ Role of the variable in the users program

2 $ type of variable: 1 =integer, 2 =floating point

y $ Is the variable NU an array?

n $ Do you want to establish new dimensions for NU ?

Poisson ratio

n $ Do you want to include a "help" paragraph?

y $ Any more variables for role types 1 or 2 ? $60

1 $ Type of prompt: 0="help" paragraph, 1=one-line prompt

ALPHA1 $ Name of a variable in the users program (defined below)

2 $ Role of the variable in the users program

2 $ type of variable: 1 =integer, 2 =floating point

y $ Is the variable ALPHA1 an array?

n $ Do you want to establish new dimensions for ALPHA1 ?

meridional coef. thermal expansion

n $ Do you want to include a "help" paragraph?

y $ Any more variables for role types 1 or 2 ? $65

1 $ Type of prompt: 0="help" paragraph, 1=one-line prompt

ALPHA2 $ Name of a variable in the users program (defined below)

2 $ Role of the variable in the users program

2 $ type of variable: 1 =integer, 2 =floating point

y $ Is the variable ALPHA2 an array?

n $ Do you want to establish new dimensions for ALPHA2 ?

circumf.coef.thermal expansion

n $ Do you want to include a "help" paragraph?

y $ Any more variables for role types 1 or 2 ? $70

1 $ Type of prompt: 0="help" paragraph, 1=one-line prompt

TEMPER $ Name of a variable in the users program (defined below)

2 $ Role of the variable in the users program

2 $ type of variable: 1 =integer, 2 =floating point

y $ Is the variable TEMPER an array?

n $ Do you want to establish new dimensions for TEMPER ?

delta-T from fabrication temperature

n $ Do you want to include a "help" paragraph?

y $ Any more variables for role types 1 or 2 ? $75

1 $ Type of prompt: 0="help" paragraph, 1=one-line prompt

DENSTY $ Name of a variable in the users program (defined below)

2 $ Role of the variable in the users program

2 $ type of variable: 1 =integer, 2 =floating point

y $ Is the variable DENSTY an array?

n $ Do you want to establish new dimensions for DENSTY ?

weight density of material

n $ Do you want to include a "help" paragraph?

y $ Any more variables for role types 1 or 2 ? $80

0 $ Type of prompt: 0="help" paragraph, 1=one-line prompt

Next, you will be asked to supply the decision variable

y $ Are there more lines in the "help" paragraph?

candidates. These are as follows:

y $ Are there more lines in the "help" paragraph?

1. HEIGHT = radial difference between the inner radius, RADIUS,

y $ Are there more lines in the "help" paragraph?

and the outer radius where the various segments

y $ Are there more lines in the "help" paragraph?

of the "balloon" are joined together.

y $ Are there more lines in the "help" paragraph?

2. RINNER = radius of curvature of the inner curved membrane,

y $ Are there more lines in the "help" paragraph?

the one that "bulges" inward.

y $ Are there more lines in the "help" paragraph?

3. ROUTER = radius of curvature of the outer curved membrane,

y $ Are there more lines in the "help" paragraph?

the one that "bulges" outward

y $ Are there more lines in the "help" paragraph?

4. TINNER = thickness of the inner curved membrane

y $ Are there more lines in the "help" paragraph?

5. TOUTER = thickness of the outer curved membrane

y $ Are there more lines in the "help" paragraph?

6. TFINNR = thickness of outer triangular truss segment

y $ Are there more lines in the "help" paragraph?

7. TFOUTR = thickness of inner triagular truss segment

y $ Are there more lines in the "help" paragraph?

8, TFWEBS = thickness of the webs

n $ Are there more lines in the "help" paragraph?

1 $ Type of prompt: 0="help" paragraph, 1=one-line prompt

HEIGHT $ Name of a variable in the users program (defined below)

1 $ Role of the variable in the users program

n $ Is the variable HEIGHT an array?

height from inner to outer membranes

y $ Do you want to include a "help" paragraph?

This is the difference from inner to outer radii at the

y $ Any more lines in the "help" paragraph?

points where the inner segments are joined to eachother

y $ Any more lines in the "help" paragraph?

and the outer segments are joined to eachother, that is,

y $ Any more lines in the "help" paragraph?

the height between inner and outer walls of the "balloon"

y $ Any more lines in the "help" paragraph?

not including the inward "bulging" of the inner wall and

y $ Any more lines in the "help" paragraph?

the outward "bulging" of the outer wall.

n $ Any more lines in the "help" paragraph?

y $ Any more variables for role types 1 or 2 ? $90

1 $ Type of prompt: 0="help" paragraph, 1=one-line prompt

RINNER $ Name of a variable in the users program (defined below)

1 $ Role of the variable in the users program

n $ Is the variable RINNER an array?

radius of curvature of inner membrane

n $ Do you want to include a "help" paragraph?

y $ Any more variables for role types 1 or 2 ? $95

1 $ Type of prompt: 0="help" paragraph, 1=one-line prompt

ROUTER $ Name of a variable in the users program (defined below)

1 $ Role of the variable in the users program

n $ Is the variable ROUTER an array?

radius of curvature of outer membrane

n $ Do you want to include a "help" paragraph?

y $ Any more variables for role types 1 or 2 ? $100

1 $ Type of prompt: 0="help" paragraph, 1=one-line prompt

TINNER $ Name of a variable in the users program (defined below)

1 $ Role of the variable in the users program

n $ Is the variable TINNER an array?

thickness of the inner curved membrane

n $ Do you want to include a "help" paragraph?

y $ Any more variables for role types 1 or 2 ? $105

1 $ Type of prompt: 0="help" paragraph, 1=one-line prompt

TOUTER $ Name of a variable in the users program (defined below)

1 $ Role of the variable in the users program

n $ Is the variable TOUTER an array?

thickness of the outer curved membrane

n $ Do you want to include a "help" paragraph?

y $ Any more variables for role types 1 or 2 ? $110

1 $ Type of prompt: 0="help" paragraph, 1=one-line prompt

TFINNR $ Name of a variable in the users program (defined below)

1 $ Role of the variable in the users program

n $ Is the variable TFINNR an array?

thickness of inner truss-core segment

y $ Do you want to include a "help" paragraph?

The three straight segments that form each module of the

y $ Any more lines in the "help" paragraph?

truss core have different thicknesses as follows:

y $ Any more lines in the "help" paragraph?

1. The outer truss-core member that is oriented in the

y $ Any more lines in the "help" paragraph?

circumferential direction has thickness, TFOUTR.

y $ Any more lines in the "help" paragraph?

2. The inner truss-core member that is oriented in the

y $ Any more lines in the "help" paragraph?

circumferential direction has thickness, TFINNR.

y $ Any more lines in the "help" paragraph?

3. The two truss-core webs each have thickness, TFWEBS

n $ Any more lines in the "help" paragraph?

y $ Any more variables for role types 1 or 2 ? $115

1 $ Type of prompt: 0="help" paragraph, 1=one-line prompt

TFOUTR $ Name of a variable in the users program (defined below)

1 $ Role of the variable in the users program

n $ Is the variable TFWEBS an array?

thickness of the outer truss segment

y $ Do you want to include a "help" paragraph?

The three straight segments that form each module of the

y $ Any more lines in the "help" paragraph?

truss core have different thicknesses as follows:

y $ Any more lines in the "help" paragraph?

1. The outer truss-core member that is oriented in the

y $ Any more lines in the "help" paragraph?

circumferential direction has thickness, TFOUTR.

y $ Any more lines in the "help" paragraph?

2. The inner truss-core member that is oriented in the

y $ Any more lines in the "help" paragraph?

circumferential direction has thickness, TFINNR.

y $ Any more lines in the "help" paragraph?

3. The two truss-core webs each have thickness, TFWEBS

n $ Any more lines in the "help" paragraph?

y $ Any more variables for role types 1 or 2 ? $120

1 $ Type of prompt: 0="help" paragraph, 1=one-line prompt

TFWEBS $ Name of a variable in the users program (defined below)

1 $ Role of the variable in the users program

n $ Is the variable TFOUTR an array?

thickness of each truss-core web

y $ Do you want to include a "help" paragraph?

The three straight segments that form each module of the

y $ Any more lines in the "help" paragraph?

truss core have different thicknesses as follows:

y $ Any more lines in the "help" paragraph?

1. The outer truss-core member that is oriented in the

y $ Any more lines in the "help" paragraph?

circumferential direction has thickness, TFOUTR.

y $ Any more lines in the "help" paragraph?

2. The inner truss-core member that is oriented in the

y $ Any more lines in the "help" paragraph?

circumferential direction has thickness, TFINNR.

y $ Any more lines in the "help" paragraph?

3. The two truss-core webs each have thickness, TFWEBS

n $ Any more lines in the "help" paragraph?

n $ Any more variables for role types 1 or 2 ? $

0 $ Type of prompt: 0="help" paragraph, 1=one-line prompt

Next, you will be asked to provide three pressures,

y $ Are there more lines in the "help" paragraph?

PINNER, PMIDDL, and POUTER, which are different from

y $ Are there more lines in the "help" paragraph?

each other and which are uniform over the entire structure.

y $ Are there more lines in the "help" paragraph?

1. PINNER = pressure inside the inner membrane. This is

y $ Are there more lines in the "help" paragraph?

the lowest of the three pressures.

y $ Are there more lines in the "help" paragraph?

2. PMIDDL = pressure between the inner membrane and outer

y $ Are there more lines in the "help" paragraph?

membrane. This is the highest of the three

y $ Are there more lines in the "help" paragraph?

pressures.

y $ Are there more lines in the "help" paragraph?

3. POUTER = pressure outside the outer membrane. This

y $ Are there more lines in the "help" paragraph?

pressure is higher than PINNER and lower than

y $ Are there more lines in the "help" paragraph?

PMIDDL.

y $ Any more lines in the "help" paragraph?

Use positive numbers for PINNER, PMIDDL, and POUTER.

n $ Are there more lines in the "help" paragraph?

1 $ Type of prompt: 0="help" paragraph, 1=one-line prompt

PINNER $ Name of a variable in the users program (defined below)

3 $ Role of the variable in the users program

pressure inside the inner membrane

n $ Do you want to include a "help" paragraph?

y $ Any more variables for role type 3 ? $140

1 $ Type of prompt: 0="help" paragraph, 1=one-line prompt

PMIDDL $ Name of a variable in the users program (defined below)

3 $ Role of the variable in the users program

pressure between inner and outer membranes

n $ Do you want to include a "help" paragraph?

y $ Any more variables for role type 3 ? $145

1 $ Type of prompt: 0="help" paragraph, 1=one-line prompt

POUTER $ Name of a variable in the users program (defined below)

3 $ Role of the variable in the users program

pressure outside the outer membrane

n $ Do you want to include a "help" paragraph?

n $ Any more variables for role type 3 ? $

0 $ Type of prompt: 0="help" paragraph, 1=one-line prompt

Next, you will be asked to provide the "behaviors" that

y $ Are there more lines in the "help" paragraph?

might affect the evolution of the design during optimization

y $ Are there more lines in the "help" paragraph?

cycles. The "behaviors" included here are:

y $ Are there more lines in the "help" paragraph?

1. general buckling: GENBUK, GENBUKA, GENBUKF

y $ Are there more lines in the "help" paragraph?

GENBUK = general buckling load factor

y $ Are there more lines in the "help" paragraph?

GENBUKA= general buckling allowable

y $ Are there more lines in the "help" paragraph?

GENBUKF= general buckling factor of safety

y $ Any more lines in the "help" paragraph?

NOTE: The "GENBUK" mode shape may actually represent

y $ Any more lines in the "help" paragraph?

local buckling, not general buckling. In this generic

y $ Any more lines in the "help" paragraph?

"balloon" case only the lowest buckling eigenvalue

y $ Any more lines in the "help" paragraph?

is computed, whether it correspond to a general

y $ Any more lines in the "help" paragraph?

buckling mode shape or whether it correspond to a

y $ Any more lines in the "help" paragraph?

local buckling mode shape. Whichever buckling mode

y $ Any more lines in the "help" paragraph?

happens to be represented by "GENBUK" will correspond

y $ Any more lines in the "help" paragraph?

to the lowest eigenvalue. The other type of buckling

y $ Any more lines in the "help" paragraph?

(general buckling if the lowest eigenvalue corresponds

y $ Any more lines in the "help" paragraph?

to local buckling and local buckling if the lowest

y $ Any more lines in the "help" paragraph?

eigenvalue corresponds to general buckling) will be

y $ Any more lines in the "help" paragraph?

higher than the eigenvalue used to generate the

y $ Any more lines in the "help" paragraph?

buckling constraint condition.

y $ Are there more lines in the "help" paragraph?

2. stresses: STRMi(j,k), STRMiA(j,k), STRMiF(j,k)

y $ Are there more lines in the "help" paragraph?

in which "i" is the material number, "j" is the load case

y $ Are there more lines in the "help" paragraph?

number, and "k" is the stress component.

y $ Are there more lines in the "help" paragraph?

STRMi(j,k) is the maximum stress.

y $ Are there more lines in the "help" paragraph?

STRMiA(j,k) is the stress allowable

y $ Are there more lines in the "help" paragraph?

STRMiF(j,k) is the stress factor of safety.

y $ Are there more lines in the "help" paragraph?

There are five stress components:

y $ Are there more lines in the "help" paragraph?

STRMi(j,1) = maximum tensile stress in the meridional direction

y $ Are there more lines in the "help" paragraph?

STRMi(j,2) = maximum compressive stress in the meridional direction

y $ Are there more lines in the "help" paragraph?

STRMi(j,3) = maxiamum tensile stress in the circumfer. direction

y $ Are there more lines in the "help" paragraph?

STRMi(j,4) = maximum compressive stress in the circumf.direction

y $ Are there more lines in the "help" paragraph?

STRMi(j,5) = maximum in-plane shear stress.

n $ Are there more lines in the "help" paragraph?

1 $ Type of prompt: 0="help" paragraph, 1=one-line prompt

GENBUK $ Name of a variable in the users program (defined below)

4 $ Role of the variable in the users program

n $ Do you want to reset the number of columns in GENBUK ?

general buckling load factor

n $ Do you want to include a "help" paragraph?

1 $ Type of prompt: 0="help" paragraph, 1=one-line prompt

GENBUKA $ Name of a variable in the users program (defined below)

5 $ Role of the variable in the users program

allowable for general buckling load factor

y $ Do you want to include a "help" paragraph?

Usually, you supply 1.0 for GENBUKA because GENBUK is

y $ Any more lines in the "help" paragraph?

a buckling load FACTOR, that is, a quantity that is

y $ Any more lines in the "help" paragraph?

to be multiplied by the design loads in order to obtain

y $ Any more lines in the "help" paragraph?

the buckling load.

n $ Any more lines in the "help" paragraph?

1 $ Type of prompt: 0="help" paragraph, 1=one-line prompt

GENBUKF $ Name of a variable in the users program (defined below)

6 $ Role of the variable in the users program

general buckling factor of safety

y $ Do you want to include a "help" paragraph?

For this problem, use 1.0.

n $ Any more lines in the "help" paragraph?

2 $ Indicator (1 or 2 or 3) for type of constraint

y $ Any more variables for role type 4 ? $170

1 $ Type of prompt: 0="help" paragraph, 1=one-line prompt

STRM1 $ Name of a variable in the users program (defined below)

4 $ Role of the variable in the users program

y $ Do you want to reset the number of columns in STRM1 ?

2 $ Number of dimensions in the array, STRM1

stress component number

5 $ Max. allowable number of columns NCOLS in the array, STRM1

stress component in material 1

y $ Do you want to include a "help" paragraph?

For an orthotropic material there are 5 stress components

y $ Any more lines in the "help" paragraph?

for which stress constraints may be generated:

y $ Any more lines in the "help" paragraph?

1. maximum tensile stess in the meridional direction

y $ Any more lines in the "help" paragraph?

2. maximum compressive stress in the meridional direction

y $ Any more lines in the "help" paragraph?

3. maximum tensile stress in the circumferential direction

y $ Any more lines in the "help" paragraph?

4. maximum compressive stress in the circumferential direction

y $ Any more lines in the "help" paragraph?

5. maximum in-plane shear stress

n $ Any more lines in the "help" paragraph?

1 $ Type of prompt: 0="help" paragraph, 1=one-line prompt

STRM1A $ Name of a variable in the users program (defined below)

5 $ Role of the variable in the users program

allowable stress in material 1

y $ Do you want to include a "help" paragraph?

For an orthotropic material there are 5 stress components

y $ Any more lines in the "help" paragraph?

for which stress constraints are generated:

y $ Any more lines in the "help" paragraph?

1. maximum tensile stress in the meridional direction:

y $ Any more lines in the "help" paragraph?

STRM1A(i,1), in which "i" is the load set number

y $ Any more lines in the "help" paragraph?

2. maximum compressive stress in the meridional direction:

y $ Any more lines in the "help" paragraph?

STRM1A(i,2), in which "i" is the load set number

y $ Any more lines in the "help" paragraph?

3. maximum tensile stress in the circumferential direction:

y $ Any more lines in the "help" paragraph?

STRM1A(i,3), in which "i" is the load set number

y $ Any more lines in the "help" paragraph?

4. maximum compressive stress in the circumferential direction:

y $ Any more lines in the "help" paragraph?

STRM1A(i,4), in which "i" is the load set number

y $ Any more lines in the "help" paragraph?

5. maximum in-plane shear stress

y $ Any more lines in the "help" paragraph?

STRM1A(i,5), in which "i" is the load set number

n $ Any more lines in the "help" paragraph?

1 $ Type of prompt: 0="help" paragraph, 1=one-line prompt

STRM1F $ Name of a variable in the users program (defined below)

6 $ Role of the variable in the users program

factor of safety for stress in material 1

y $ Do you want to include a "help" paragraph?

In this application use a factor of safety of 1.0

n $ Any more lines in the "help" paragraph?

3 $ Indicator (1 or 2 or 3) for type of constraint

y $ Any more variables for role type 4 ? $190

1 $ Type of prompt: 0="help" paragraph, 1=one-line prompt

STRM2 $ Name of a variable in the users program (defined below)

4 $ Role of the variable in the users program

n $ Do you want to reset the number of columns in STRM2 ?

stress component in material 2

n $ Do you want to include a "help" paragraph?

1 $ Type of prompt: 0="help" paragraph, 1=one-line prompt

STRM2A $ Name of a variable in the users program (defined below)

5 $ Role of the variable in the users program

allowable for stress in material 2

n $ Do you want to include a "help" paragraph?

1 $ Type of prompt: 0="help" paragraph, 1=one-line prompt

STRM2F $ Name of a variable in the users program (defined below)

6 $ Role of the variable in the users program

factor of safety for stress in material 2

n $ Do you want to include a "help" paragraph?

3 $ Indicator (1 or 2 or 3) for type of constraint

y $ Any more variables for role type 4 ? $205

1 $ Type of prompt: 0="help" paragraph, 1=one-line prompt

STRM3 $ Name of a variable in the users program (defined below)

4 $ Role of the variable in the users program

n $ Do you want to reset the number of columns in STRM3 ?

stress component in material 3

n $ Do you want to include a "help" paragraph?

1 $ Type of prompt: 0="help" paragraph, 1=one-line prompt

STRM3A $ Name of a variable in the users program (defined below)

5 $ Role of the variable in the users program

allowable for stress in material 3

n $ Do you want to include a "help" paragraph?

1 $ Type of prompt: 0="help" paragraph, 1=one-line prompt

STRM3F $ Name of a variable in the users program (defined below)

6 $ Role of the variable in the users program

factor of safety for stress in material 3

n $ Do you want to include a "help" paragraph?

3 $ Indicator (1 or 2 or 3) for type of constraint

n $ Any more variables for role type 4 ? $

0 $ Type of prompt: 0="help" paragraph, 1=one-line prompt

Next, you will be asked to provide an objective.

y $ Are there more lines in the "help" paragraph?

In this case the objective is the weight/(axial length)

y $ Are there more lines in the "help" paragraph?

of the balloon.

n $ Are there more lines in the "help" paragraph?

1 $ Type of prompt: 0="help" paragraph, 1=one-line prompt

WEIGHT $ Name of a variable in the users program (defined below)

7 $ Role of the variable in the users program

weight/length of the balloon

n $ Do you want to include a "help" paragraph?

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