Examples of buckling solutions obtained from FEA. These are all pure elastic (eigenvalue) solutions and will usually give higher values for buckling loads than are actually seen on real parts.

1. Long column – steel 4” x 6” section, 200” long

Critical load $P_c = \pi^2 EI/L^2$ = 236870 lb. (weak direction)

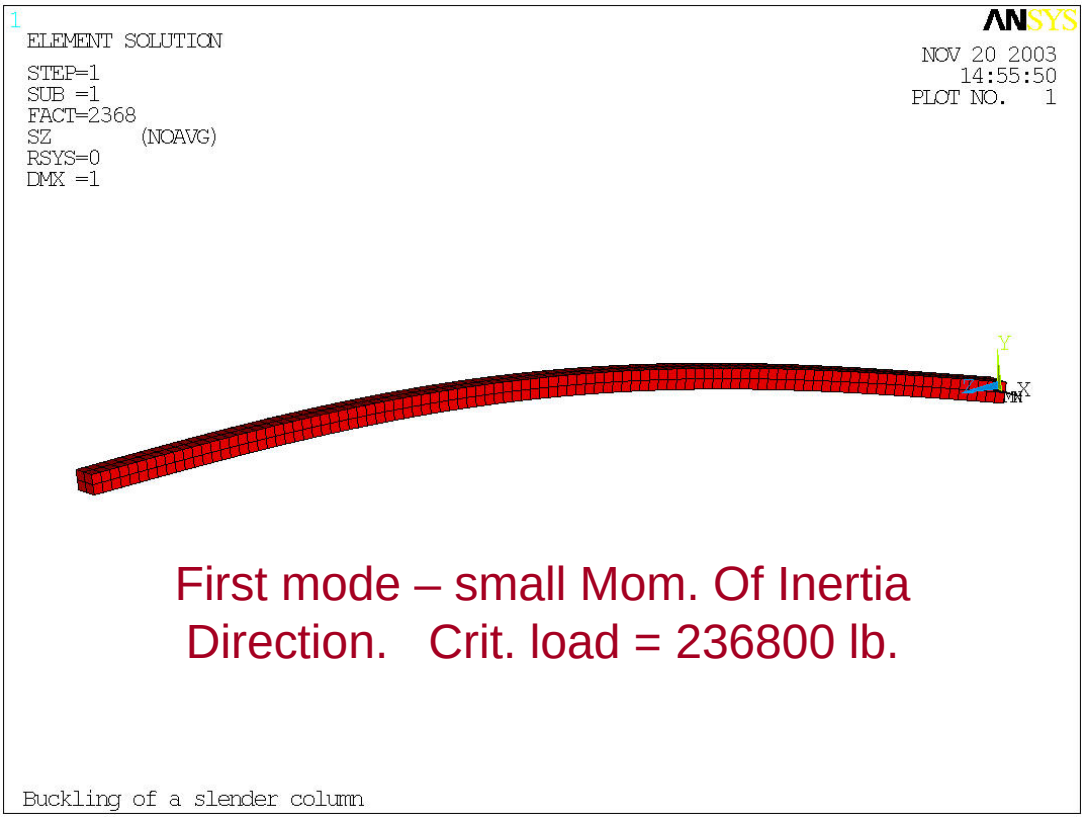
532960 lb. (strong direction)

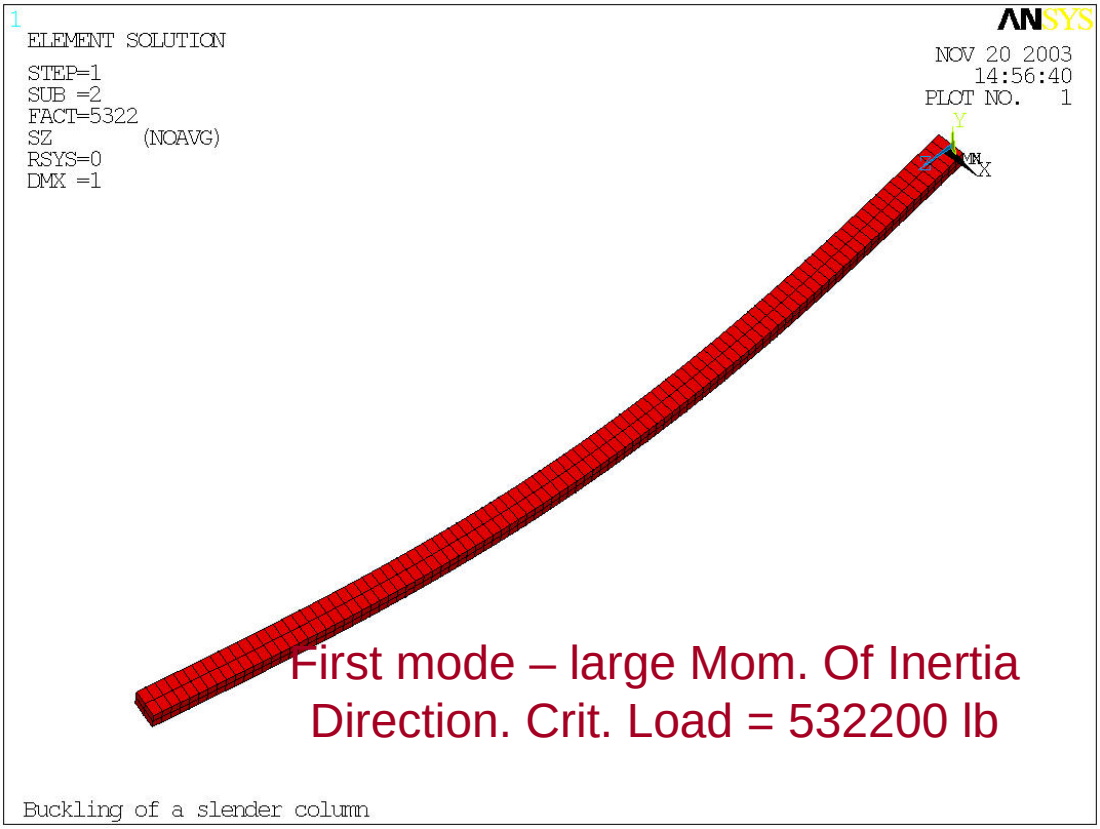
Second Mode: $P_c = 4\pi 2EI/L^2$ = 947480 lb. (weak direction)

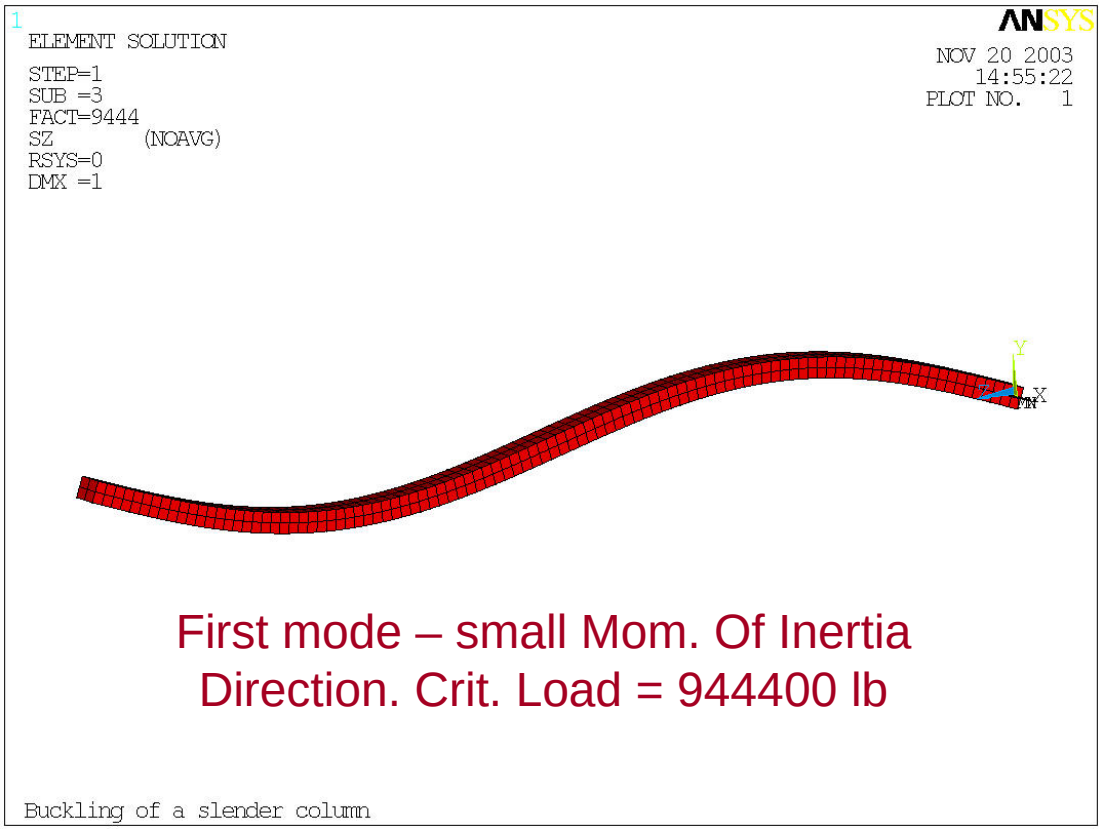
2131840 lb. (strong direction)

2. Flat Al plate, 10” x 10” x .05”, simple support around all 4 edges. Compressive edge load in one direction.

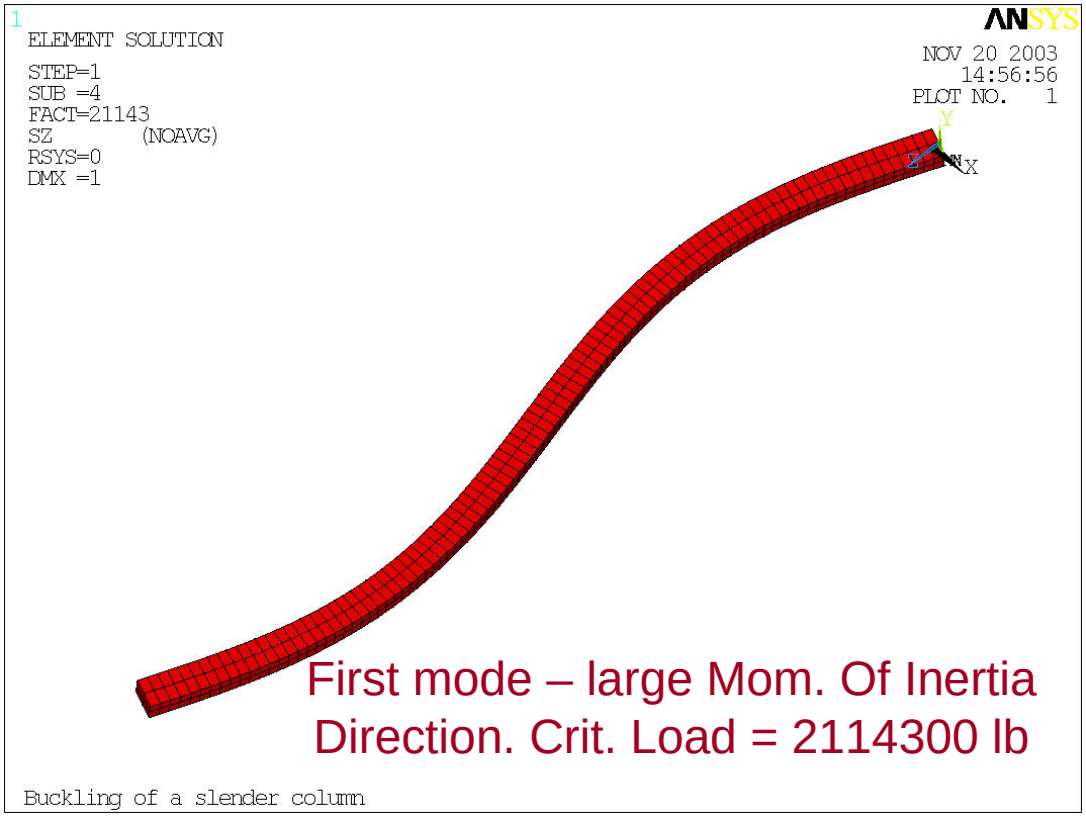
3. Thin walled aluminum tube 2” OD, 0.05” wall thickness. Fixed at one end. Torque applied at other end.


1
ELEMENT SOLUTION
STEP=1
SUB =1
FACT=2368
SZ (NOAVG)
RSYS=0
DMX =1
ANSYS
NOV 20 2003
14:55:50
PLOT NO. 1
Y
X
MN
First mode – small Mom. Of Inertia
Direction. Crit. load = 236800 lb.
Buckling of a slender column

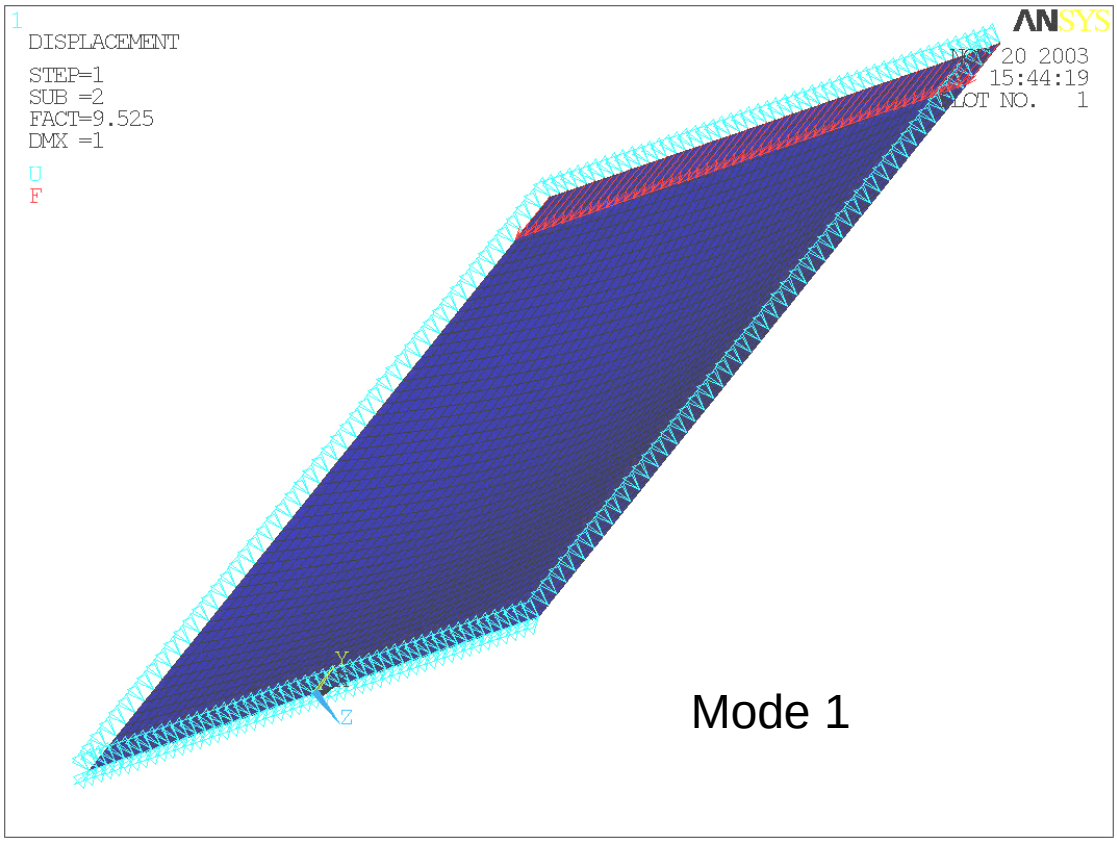

1
ELEMENT SOLUTION
STEP=1
SUB =2
FACT=5322
SZ (NOAVG)
RSYS=0
DMX =1
ANSYS
NOV 20 2003
14:56:40
PLOT NO. 1
Y
Z
MN
X
First mode – large Mom. Of Inertia
Direction. Crit. Load = 532200 lb
Buckling of a slender column

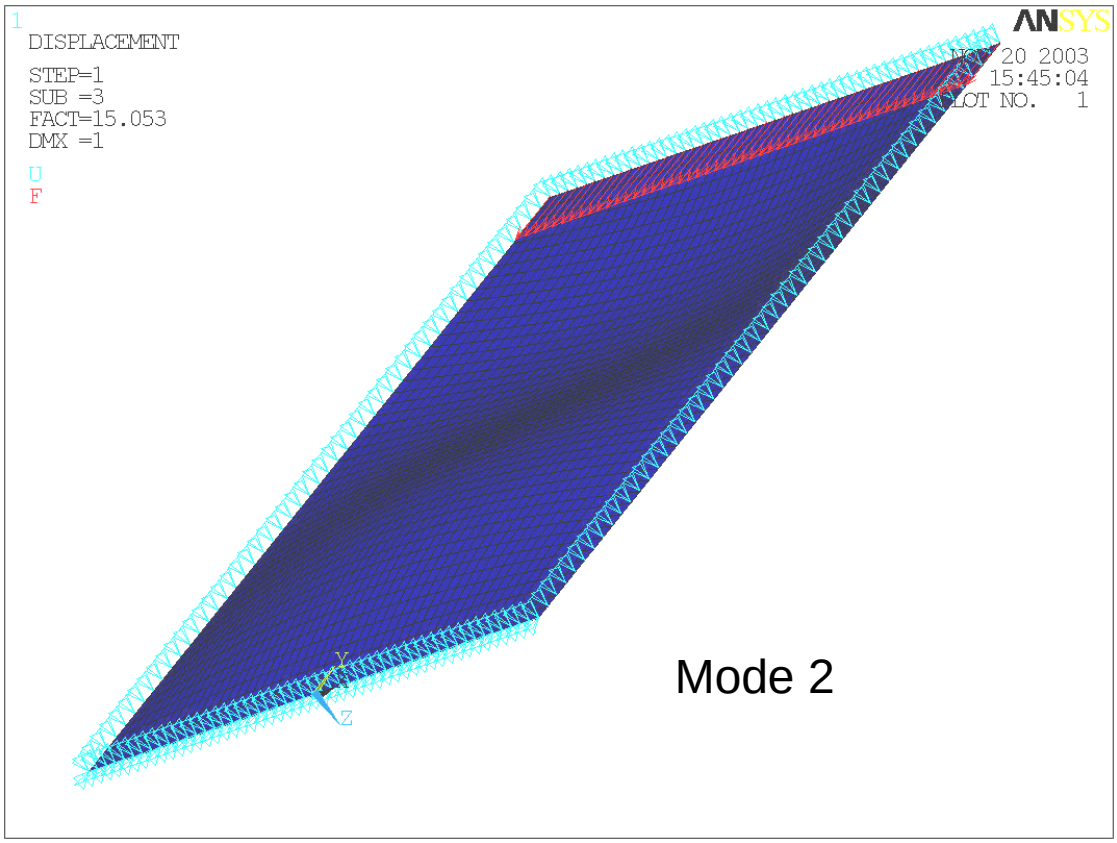


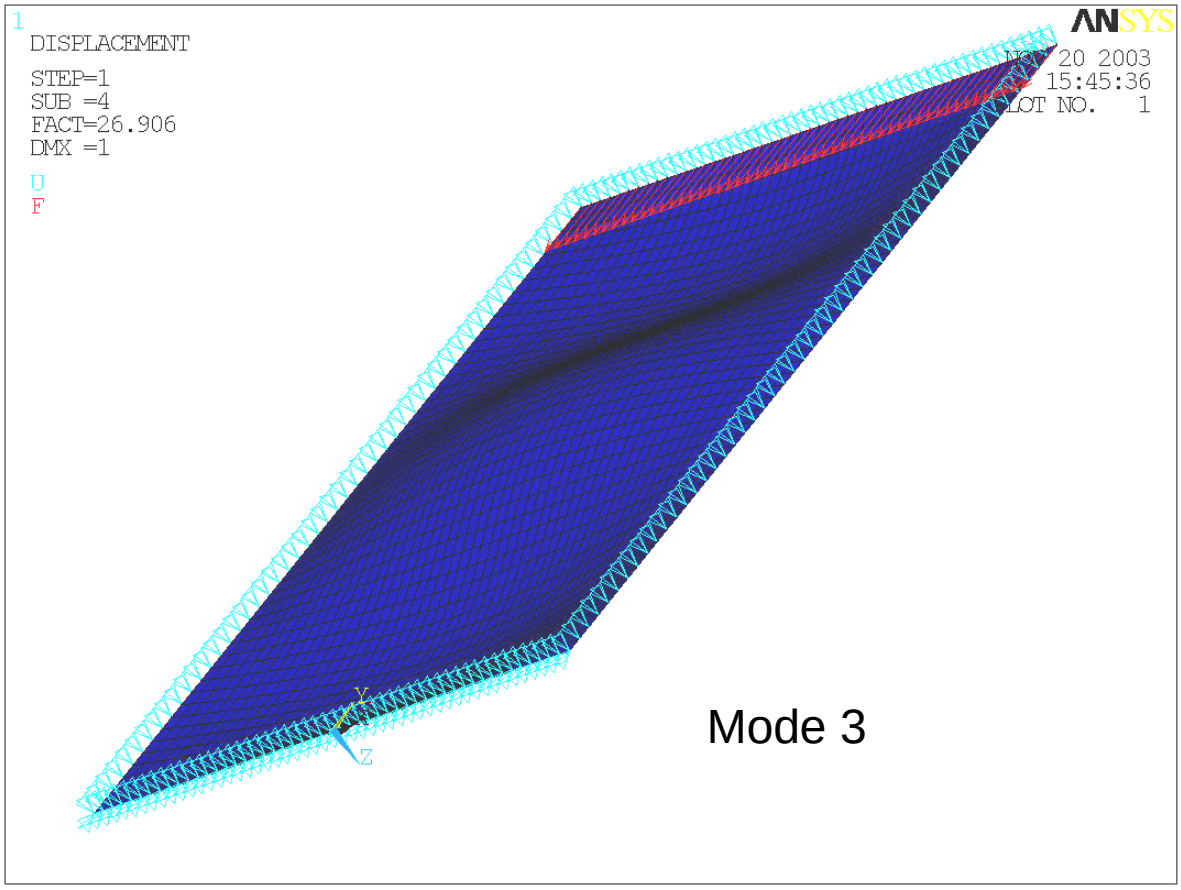
First mode – small Mom. Of Inertia Direction. Crit. Load = 944400 lb



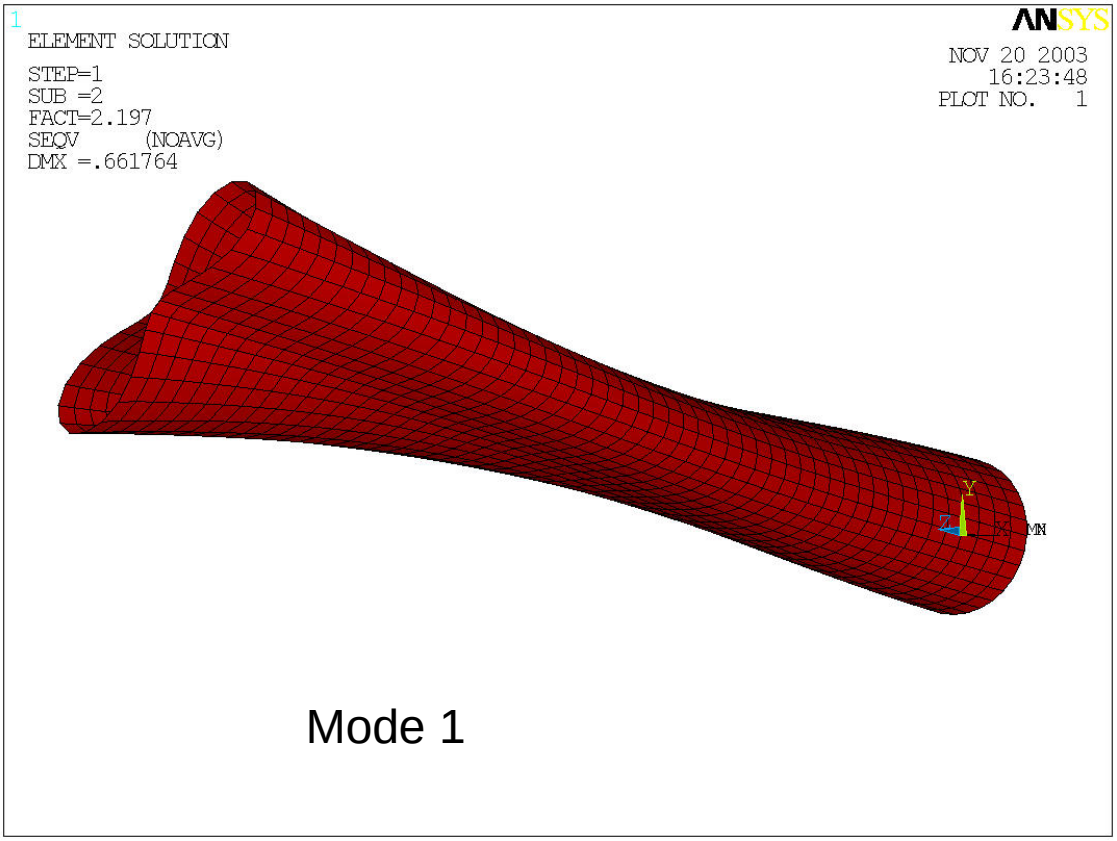
First mode – large Mom. Of Inertia Direction. Crit. Load = 2114300 lb


1
DISPLACEMENT
STEP=1
SUB =2
FACT=9.525
DMX =1
U
F
ANSYS
NOV 20 2003
15:44:19
PLOT NO. 1
Y
Z
Mode 1


1
DISPLACEMENT
STEP=1
SUB =3
FACT=15.053
DMX =1
U
F
ANSYS
NOV 20 2003
15:45:04
PLOT NO. 1
Y
Z
Mode 2


1
DISPLACEMENT
STEP=1
SUB =4
FACT=26.906
DMX =1
U
F
ANSYS
NOV 20 2003
15:45:36
PLOT NO. 1
Y
Z

Mode 3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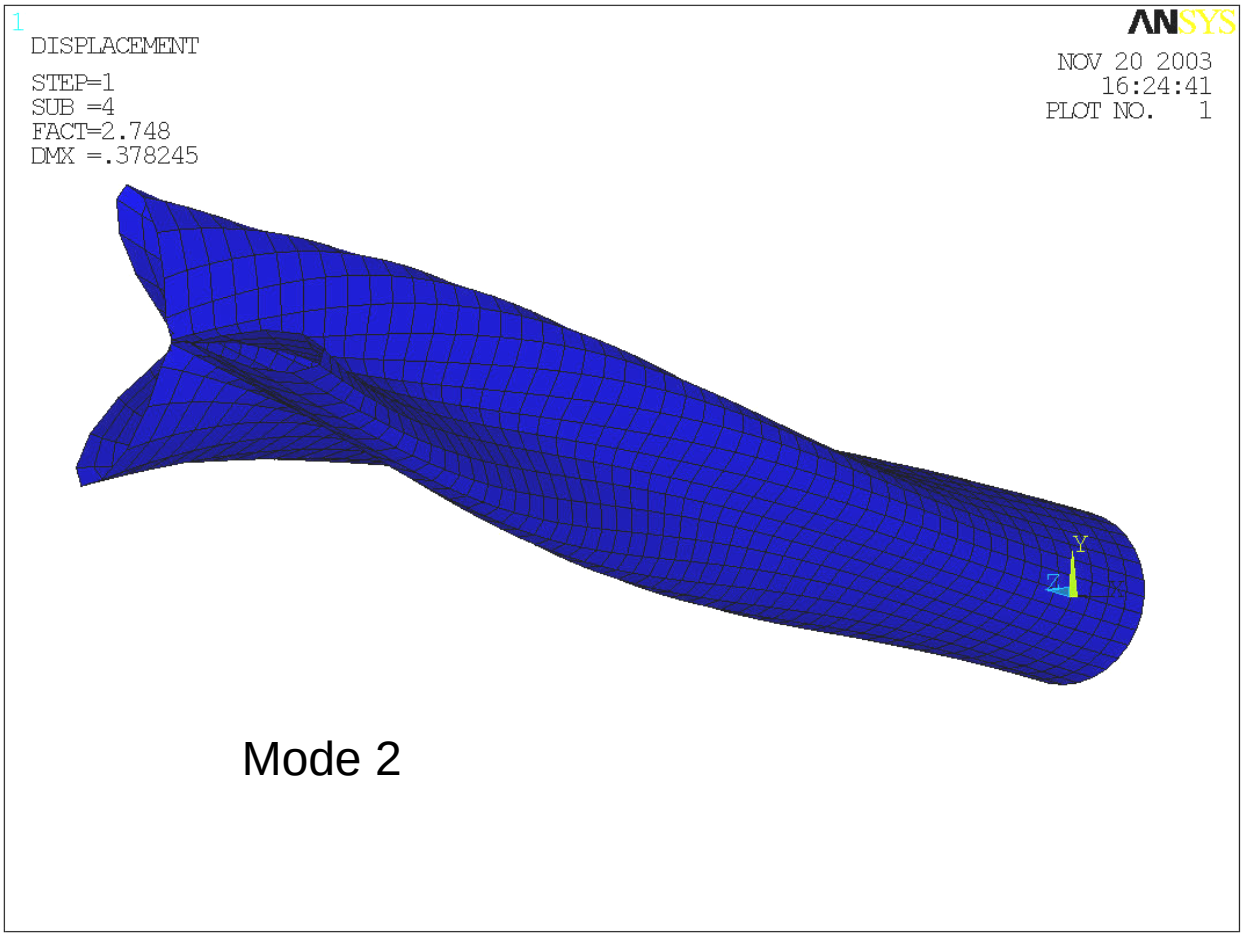
ELEMENT SOLUTION
STEP=1
SUB =2
FACT=2.197
SEQV (NOAVG)
DMX =.661764
ANSYS
NOV 20 2003
16:23:48
PLOT NO. 1
Y
Z

Mode 1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DISPLACEMENT
STEP=1
SUB =4
FACT=2.748
DMX =.378245
ANSYS
NOV 20 2003
16:24:41
PLOT NO. 1
Y
Z
X

Mode 2