

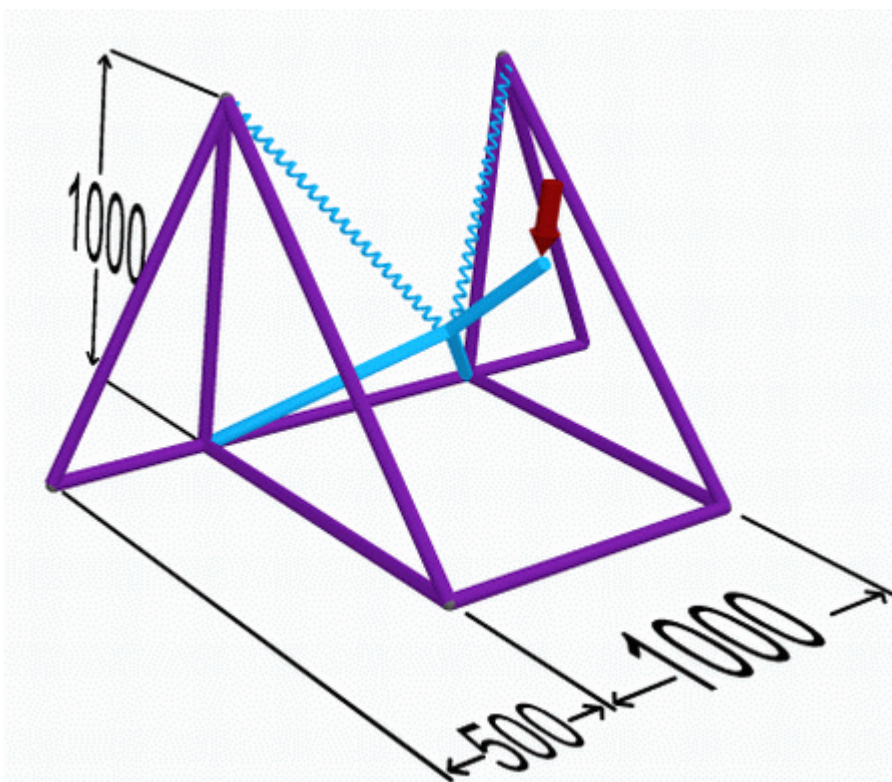
Application of Joints and Springs in ANSYS

Introduction

This tutorial was created using ANSYS 5.7.1. This tutorial will introduce:

- the use of multiple elements in ANSYS
- elements COMBIN7 (Joints) and COMBIN14 (Springs)
- obtaining/storing scalar information and store them as parameters.

A 1000N vertical load will be applied to a catapult as shown in the figure below. The catapult is built from steel tubing with an outer diameter of 40 mm, a wall thickness of 10, and a modulus of elasticity of 200GPa. The springs have a stiffness of 5 N/mm.



ANSYS Command Listing

```
/title, Catapult
/PREP7
```

```
ET,1,PIPE16           ! Element type 1
ET,2,COMBIN7          ! Element type 2
ET,3,COMBIN14         ! Element type 3
R,1,40,10             ! Real constants 1
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R,2,1e9,1e9,1e9      ! Real constants 2
R,3,5, , ,          ! Real constants 3

MP,EX,1,200000      ! Young's modulus (Material 1)
MP,PRXY,1,0.33      ! Poisson's ratio (Material 1)

N, 1, 0, 0, 0      ! Node locations
N, 2, 0, 0,1000
N, 3,1000, 0,1000
N, 4,1000, 0, 0
N, 5, 0,1000,1000
N, 6, 0,1000, 0
N, 7, 700, 700, 500
N, 8, 400, 400, 500
N, 9, 0, 0, 0
N,10, 0, 0,1000
N,11, 0, 0, 500
N,12, 0, 0,1500
N,13, 0, 0,-500

TYPE,1              ! Turn on Element 1
REAL,1              ! Turn on Real constants 1
MAT,1               ! Turn on Material 1

E, 1, 6              ! Element connectivity
E, 2, 5
E, 1, 4
E, 2, 3
E, 3, 4
E,10, 8
E, 9, 8
E, 7, 8
E,12, 5
E,13, 6
E,12,13
E, 5, 3
E, 6, 4

TYPE,2              ! Turn on Element 2
REAL,2              ! Turn on Real constants 2

E, 1, 9, 11         ! Element connectivity
E, 2, 10, 11

TYPE,3              ! Turn on Element 3
REAL,3              ! Turn on Real constants 3

E,5,8               ! Element connectivity
E,8,6

/PNUM,KP,0          ! Number nodes
/PNUM,ELEM,1        ! Number elements
/REPLOT

FINISH
/SOLU               ! Enter solution phase

ANTYPE,0            ! Static analysis
NLGEOM,ON           ! Non-linear geometry on

```

```
NSUBST,5                ! 5 Load steps of equal size

D,3,ALL,0,,,4,12,13    ! Constrain nodes 3,4,12,13
F,7,FY,-1000           ! Load node 7

SOLVE
FINISH

/POST1

PLDISP,2
*GET,VERT7,NODE,7,U,Y
```