Linear Column Buckling - Pre-Analysis & Start-Up

Author: Matt Scott, Cornell University

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Pre-Analysis & Start-Up

Pre-Analysis

We must first calculate the theoretical critical buckling load of the column.

$$F = \frac{\pi^2 EI}{(KL)^2}$$

Where:

F = maximum or critical force (vertical load on column),

E = modulus of elasticity,

I = area moment of inertia,

L = unsupported length of column,

K = column effective length factor, whose value depends on the conditions of end support of the column, as follows.

For both ends pinned (hinged, free to rotate), *K* = 1.0.

For both ends fixed, *K* = 0.50.

For one end fixed and the other end pinned, *K* = 0.699....

For one end fixed and the other end free to move laterally, *K* = 2.0.

KL is the effective length of the column.

For a circular cross section,

$$I_0 = \frac{\pi r^4}{4}$$

Therefore, for our problem, I = .003068

Therefore, our critical buckling load is = 1.51398E+7 N

Start-Up

Please look at the video located in the geometry section for the start-up step of this tutorial.

Go to Step 2: Geometry

Go to all ANSYS Learning Modules