Cantilever Beam - Pre-Analysis & Start-Up

Author: John Singleton, Cornell University

Pre-Analysis

Handout

Powerpoint slides used in the following videos can be downloaded here.

What's Under the ANSYS Blackbox?

To understand the framework of what's under the ANSYS blackbox, go through the videos in the "What's Under the Blackbox" section of our free online course on ANSYS-based simulations. Registration is required to access this course. We'll be using this framework in this tutorial.

Mathematical Model

Euler-Bernoulli Beam Theory

Strains and Stresses

Potential Energy

Potential Energy Minimization

Discretization

Interpolation

Algebraic Equations Derivation

Hand Calculations

Check Your Understanding

One or more of the following statements is/are true. Select which statements are true.

- 3D Elasticity theory makes the assumption that plane sections remain plane whereas the Euler-Bernoulli beam theory doesn't make this assumption.
- In Euler-Bernoulli beam theory, the Poisson's ratio is assumed to be zero.
- If we have 4 nodes instead of 3, ANSYS will need to determine 8 parameters (4 y-displacements and 4 rotations) either from the essential boundary conditions or by solving a set of algebraic equations.

- If we have 4 nodes instead of 3, the number of algebraic equations that ANSYS will need to solve simultaneously will be 5.
- We have to determine the y-displacement of the midline at locations between the nodes using interpolation. This interpolation is given by a second-order polynomial.

Go to Step 2: Geometry

Go to all ANSYS Learning Modules