

Cantilever Beam - Pre-Analysis & Start-Up

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Problem Specification

1. Pre-Analysis & Start-Up

2. Geometry

3. Mesh

4. Physics Setup

5. Numerical Solution

6. Numerical Results

7. Verification & Validation

Exercises

Comments

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](#)