

2D Beam - Exercises

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Exercises

Exercise 1:

Repeat the same analysis as in the tutorial using the two-dimensional approximation for plane strain (instead of plane stress). How do the predictions for the maximum transverse deflection for this analysis compare with the three-dimensional results shown in the Results Section and in Figure 4.12 of the text.

Exercise 2:

Repeat the analysis in the tutorial replacing the end simple-support boundary conditions on nodes located at the beam neutral axis. Do this using both plane stress and plane strain assumptions. How do the FEA predictions for these models compare with predictions from Euler-Bernoulli beam theory and a fully three-dimensional FEA analysis? What do the findings of this exercise lead you to conclude?

Exercise 3:

Compare the FEA predictions for maximum transverse deflection using the original model and plane stress and plane strain assumptions to FEA predictions using one-dimensional beam elements incorporating an offset neutral axis. What do you conclude?

Exercise 4:

Repeat the tutorial for a beam with cross section 3inches by 3 inches. How do FEA predictions using one-, two-, and three-dimensional models now compare with Euler-Bernoulli beam theory?

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