

MAE 263F Homework 2

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I. QUESTION 1

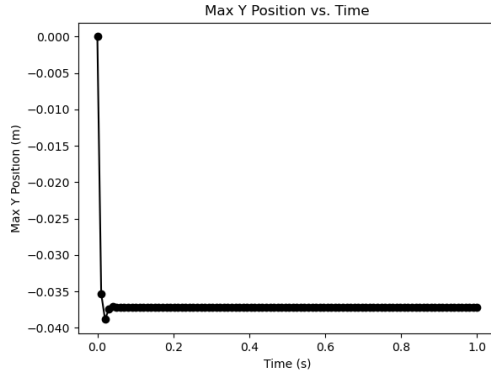


Fig. 1. Maximum vertical displacement y_{max} of the beam as a function of time.

Yes, y_{max} eventually reaches a steady value $-0.03717481951002168m$. It matches the result of the theoretical prediction from Euler beam theory which is $-0.038044915643450306m$. The error is only $\frac{0.03717481951002168 - 0.038044915643450306}{0.038044915643450306} = -2.287\%$

II. QUESTION 2

The benefit of my simulation over the predictions from beam theory is that beam theory is only accurate when the deformation is small, but my simulation works when the deflection is large, thus can be used when there is a huge load. When load $P = 20000N$, the simulation result is $-0.2352790899760484m$, but the theoretical prediction from Euler beam theory result is $-0.3804491564345031m$, there is a huge difference. From Fig. 2, they start to diverge at around 2500N.

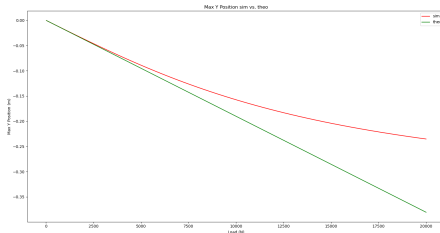


Fig. 2. load vs y_{max}