

Homework #3 (ASEN5022, Spring 2004)

Due at Start of Class on Tuesday, 02 March 2004

Problem : A cable with a flexible support at the middle.

A construction company has been designing a cable that will run between two towers in a mountain. After a preliminary analysis and a scale model test, the management came to the conclusion that a third flexible tower needs to be placed.

- 3.1 Formulate the equations of motion for this new cable system complete with the appropriate boundary conditions. Assume that the original two supporting towers are substantially stiffer than the new one to be placed at the middle of the original cable. The design team has concluded that they should model not only the flexibility but also the inertia effect of the middle tower.
- 3.2 If the new system is to have its fundamental frequency about 50 (which was the reason why a third tower is needed), how are you going to accomplish this requirement? Observe that the cable tension, T , of the original system could not be increased any further as that will result in an unacceptable bending on the original two towers.