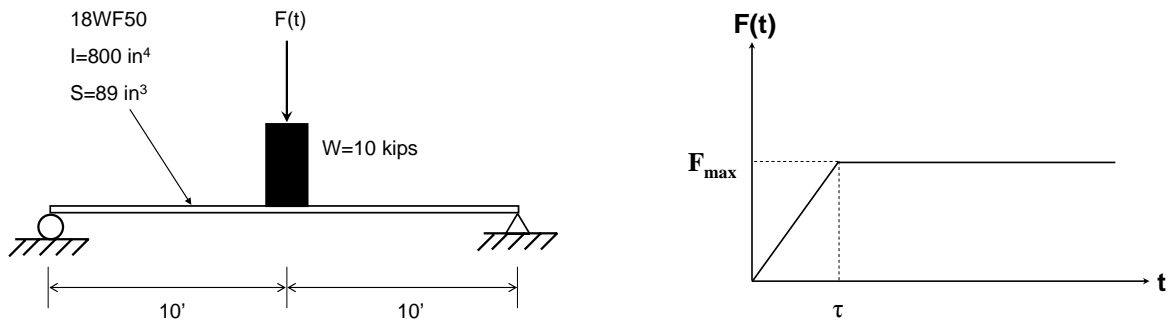


**CE 573 – Structural Dynamics**

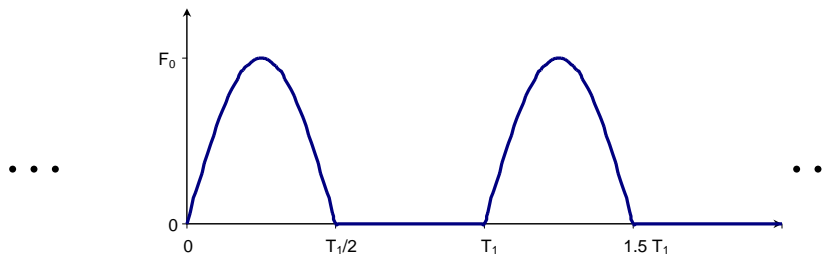
**Homework #7**

due 30 October 2009, Friday, 1:30pm

- 1) Consider a 20 ft long steel beam supporting a concentrated mass and subjected to a dynamic load. The loading has a rise time  $\tau$  of 0.075 sec and a maximum load value  $F_{\max}$  of 20 kips. The beam has a moment of inertia of  $800 \text{ in}^4$  and a section modulus of  $89 \text{ in}^3$ . Ignore the weight of the beam. Find the maximum dynamic bending stress.



- 2) Find the Fourier series expression for the periodic excitation made of half-sine waves.



- 3) Derive the equations of motion for the three-story shear frame with lumped masses as shown below. Consider the beams to be rigid. Take the flexural rigidity of the columns as  $EI$ . Neglect axial deformations in all elements. Use displacements of floors relative to the ground as the coordinates.

