

GROUP MEMBERS:

CE 8060 – STRUCTURAL DYNAMICS Homework #12

Assigned: Thursday, September 25, 2014
Due: Tuesday, September 30, 2014 (beginning of class)

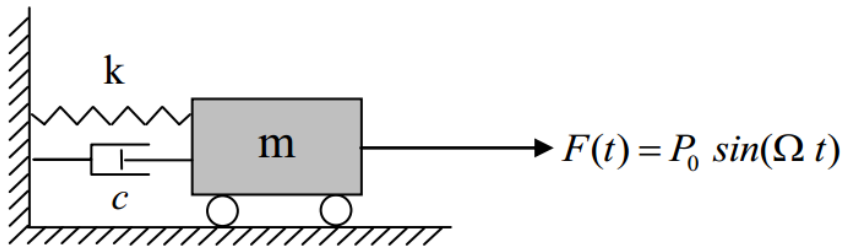
Homework must be done neatly in pencil, on 8 ½"x 11" paper, stapled together. Each step must be easily followed; diagrams are useful. Your assumptions must be clearly stated.

Make Sure to Write Both Group Members' Names!

You started working at an engineering firm as a structural engineer. The manager asked you to design a mechanism to stiffen the structure to reduce vibrations when the structure's response was in the mass controlled region. You told him that increasing the stiffness wouldn't work but your boss does not believe you.

Prove to your manager through an example study of a SDOF system under harmonic vibration as shown in the figure below. Using MATLAB to obtain necessary figures to demonstrate and explain the concept of the three regions which are called "damping-controlled", "stiffness-controlled" and "mass-controlled".

You may include the **parametric analysis cases** for your demonstration.



The default values of the structural parameters and the applied forcing function are provided in the table below.

Table: Constant values

| Variables | values |
|--|------------|
| m [kg] | 1 |
| k [N/m] | 1 |
| ζ [%] | 5% |
| $F(t)$ [N] = P_0 [N] $\sin(\Omega[\frac{rad}{sec}] \times t[s])$ | 100 sin(t) |