

GROUP MEMBERS:

CE 8060 – STRUCTURAL DYNAMICS Homework #16

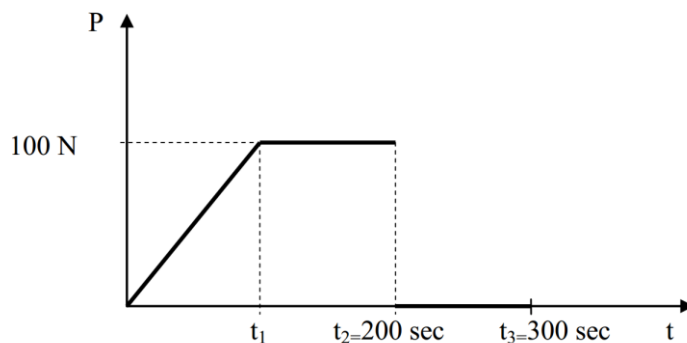
Assigned: Thursday, October 16, 2014
Due: Tuesday, October 21, 2014 (at beginning of the class)

Homework must be done neatly in pencil, on 8 1/2" 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!

Question 1: (10 points)

Using your choice of numerical integration method, determine the response of the single degree of freedom system for displacement, velocity and acceleration in 4 different load scenarios shown in the figure below. In all cases the system is initially at rest. Assume $m=1000$, $k=10$, and $\xi=1\%$.



While the load pattern remains the same, the value of t_1 in the 4 different load cases are:

- Case 1) $t_1=0.1\text{ sec}$
- Case 2) $t_1=1\text{ sec}$
- Case 3) $t_1=10\text{ sec}$
- Case 4) $t_1=100\text{ sec}$

Select the time step value of the $\Delta t = 0.001\text{ sec}$.

In the next part of the homework, for case 1 only, compare the solutions for all 4 methods you have learned so far (Central difference, and Newmark constant, average and linear acceleration methods). Plot displacement, velocity and acceleration responses for each method and overlay different graphs to compare them.