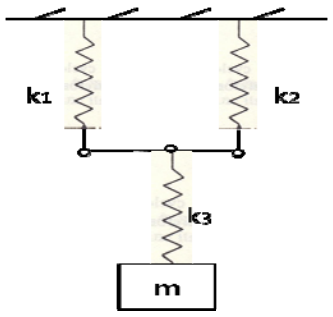
Soil Dynamics

Assignment #2

Solve the practice problem of Chapter 2 of " Soil Dynamics" by Prakash

2.1 In Example 2.1, assuming r/l to be small, derive expressions for velocity and acceleration of the piston motion. Determine the maximum velocity and acceleration and the time these values occur.

2.2(a) Write the equations of motion for the system shown in Fig.2.26a determine their natural frequency.



2.4 For the system represented by Eq.(2.44), show that the peak amplitude occurs at frequency ratio

$$r = \frac{1}{\sqrt{1-2\xi^2}} \quad \text{and} \quad A_{\max} = \frac{1}{2\xi\sqrt{1-\xi^2}}$$

If $\xi > 0.707$, r is imaginary. Discuss the significance of these values with the help of a diagram.

2.5 Determine viscous damping from a free vibration record shown in Fig. 2.9b

2.7 Explain what you understand by "average response", "mode participation factor"," degree of freedom", "principal mode", "natural frequency", "transmissibility", "damping" and "critical damping"

2.8 An unknown weight W attached to the end of an unknown spring k has a natural frequency of 95 cpm. If 1kg weight is added to W. the natural frequency is lowered to 75 cpm. Determine the weight W and spring constant K.

2.10 A 10-cm –diameter pole with a 10-m length is guided so that it floats vertically in water. The specific gravity of the pole material is 0.81. Find the pole`s natural frequency.