Assignment 1 (April 20)

1. Describe what the d'Alembert's principle is including the benefit of using d'Alembert's principle.

2. What is the difference between total (absolute) displacement and relative displacement of a system subjected to support excitation?

3. We studied undamped and damped vibration of structures. The viscous damping force is generally generated by means of viscous damper. Clarify where and how viscous dampers are used around us. Describe also what harmful even can happen if viscous damper is not used.

4. Equation of motion of a SDFS subjected to an external force p(t) at the mass (Fig. 1) is represented by Eq. (a), while the equation of motion of a SDOF system subjected to support excitation (Fig. 2) is represented by Eq. (b). Based on comparison of two equations, what can we know for the base excitation?

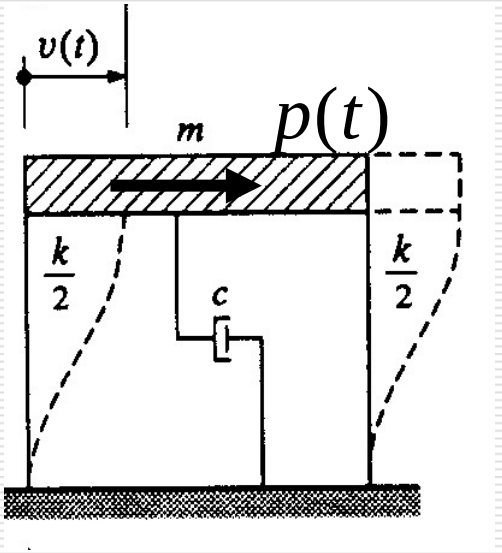

Fig. 1

$$m\ddot{v}(t) + c\dot{v}(t) + kv(t) = p(t) \qquad \text{(a)}$$

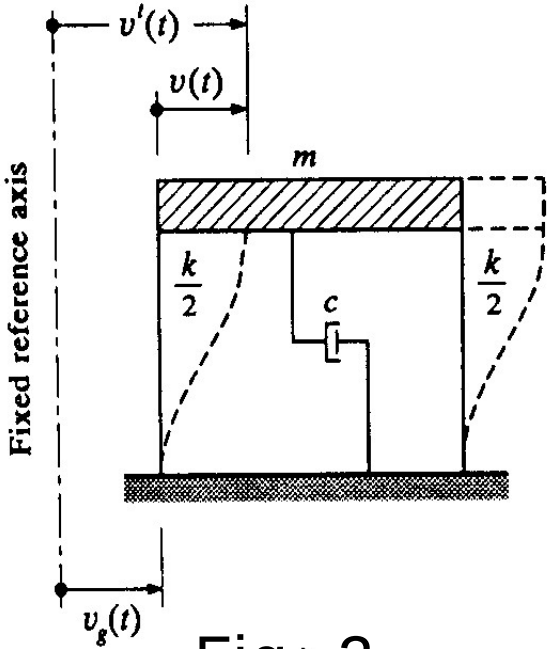

Fig. 2

$$m\ddot{v}(t) + c\dot{v}(t) + kv(t) = -m\ddot{v}_g(t) \qquad \text{(b)}$$