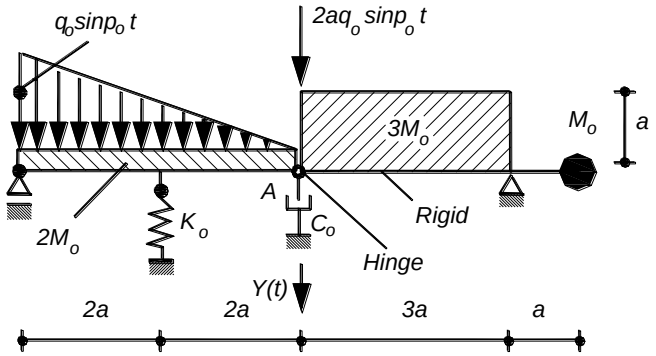
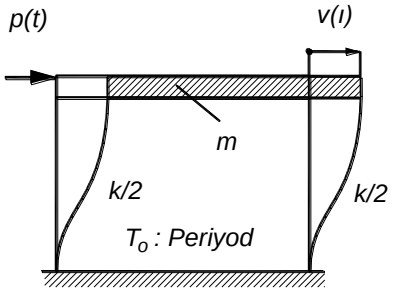
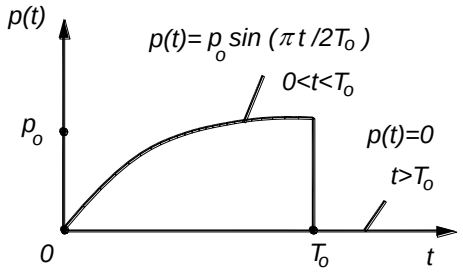
ADVANCED DYNAMICS OF STRUCTURES / QUIZ October 4, 2010

1. Write down the equation of motion of the rigid-body assemblage in terms of $Y(t)$ the vertical displacement of the point A by using the principle of the virtual work. Obtain the free vibration period $T_o = \alpha\sqrt{M_o / K_o}$ of the assemblage without considering the damping and determine α. Find the resonance condition in terms of the parameters of the system, when the damping is neglected.



2. A single degree of system of the mass m, the stiffness k is subjected to the external load $p(t)$. The variation of the external load is given as shown. Assuming the system starts from the rest position, i.e., $v(t=0)=0$ and $\dot{v}(t=0)=0$ .Find the displacement function $v(0 \le t \le T_o)$ and $v(t \ge T_o)$ separately., where T_o is the free vibration period of the system.





$$\sin a \sin b = \frac{1}{2}[\cos(a-b) - \cos(a+b)]$$

$$\cos a \cos b = \frac{1}{2}[\cos(a-b) + \cos(a+b)]$$

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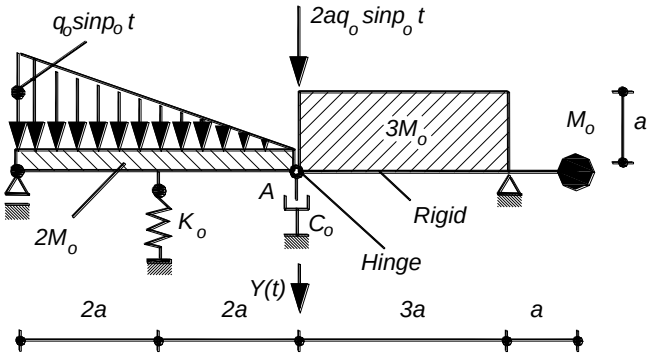

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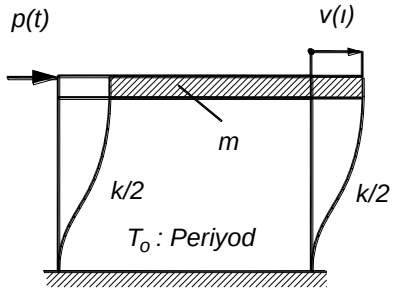

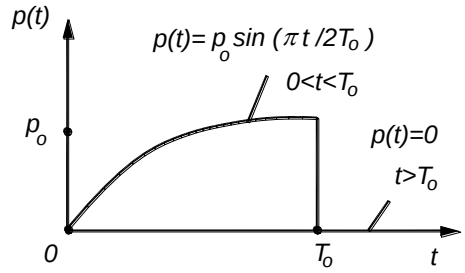

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