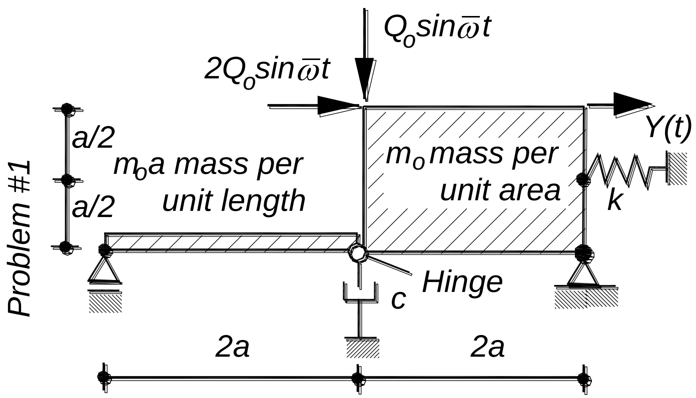
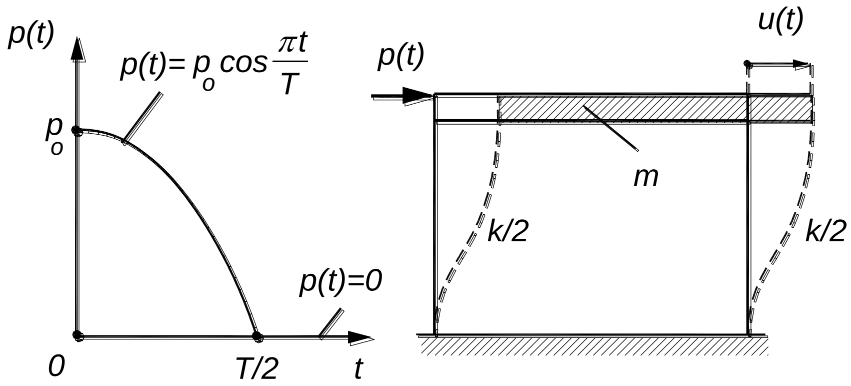
ADVANCED DYNAMICS OF STRUCTURES / Quiz; October 23, 2013

1. Write down the equation of motion of the rigid-body assemblage in terms of $Y(t)$ the horizontal displacement by using the principle of the virtual work. Obtain the free undamped vibration period $T = \alpha\sqrt{M/k}$ of the assemblage and determine α. Find the resonance condition ($\omega = \bar{\omega}$) in terms of the parameters of the undamped system, where m_o is mass per unit area of the plate and $m_o a$ is mass per unit length of the bar.





2. A single degree of freedom system of the mass m, the stiffness k is subjected to the external load $p(t)$, having a variation as shown. Assuming the system starts from the rest position, i.e., $u(t=0)=0$ and $\dot{u}(t=0)=0$, find the displacement function $u(0 \le t \le T/2)$ by using the initial conditions and $u(t \ge T/2)$ by using the continuity of the displacement and the velocity, where T is the free vibration period of the system.

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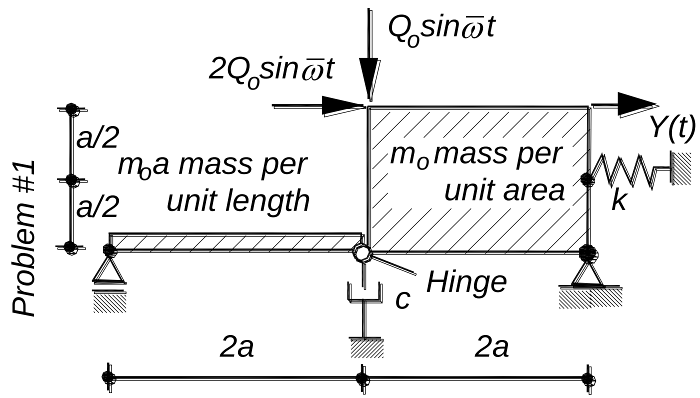

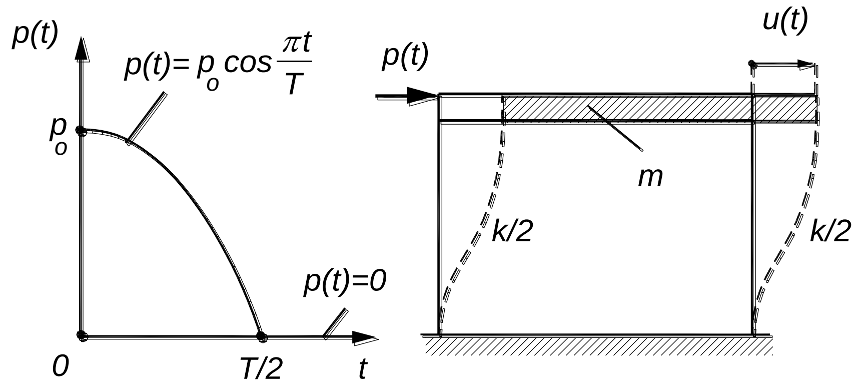

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