ADVANCED DYNAMICS OF STRUCTURES / Home Work 3 / November 25, 2007

Consider the system of two degrees-of-freedom shown:

a. Write down the equations of motion of the system by including the ground motion $v_g(t)$ and evaluate the mass matrix **m** , the rigidity matrix **k,** and the flexibility matrix **k** = **d**$^{-1}$,
b. Determine the two circular frequencies and the two periods of the free vibration ω_i and T_i and the corresponding mode shapes ϕ_1 and ϕ_2. Give their graphical representation,
c. Check the orthogonality of the modes with respect to the mass matrix and the stiffness matrix $\phi_1^T \mathbf{m}\, \phi_2$, and $\phi_1^T \mathbf{k}\, \phi_2$,
d. Evaluate the generalized masses and stiffness $M_i = \phi_i^T \mathbf{m}\, \phi_i$, and $K_i = \phi_i^T \mathbf{k}\, \phi_i$, and assess $\omega_i^{\,2} = K_i / M_i$.

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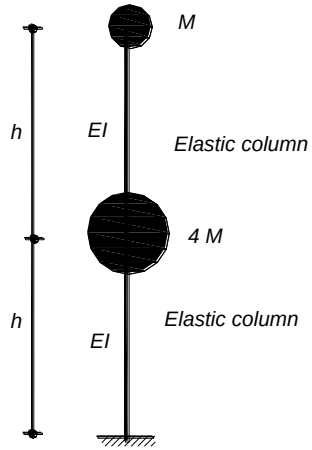

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