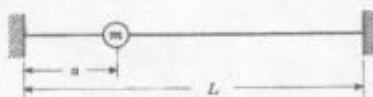


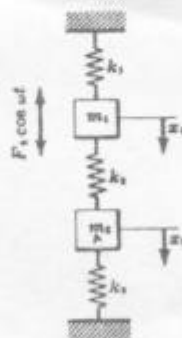
元智大學機械工程研究所 博士班資格考試
計算固力

Fall 2000

4. The string is under tension T which can be assumed to remain constant for small displacements. For small oscillations, find the natural frequency of the vertical vibration of the string.



5. Determine the steady state vibration of the two masses m_1 and m_2 as shown in the figure below



Ph. D. Qualified Examine

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Oct. 2000

1. The Cauchy stress tensor in a deformed solid is given by

$$\sigma_{11} = A x_1^2 \quad ; \quad \sigma_{22} = A x_2^2 \quad ; \quad \sigma_{12} = 2A x_1 x_2 \quad ; \quad \sigma_{13} = \sigma_{23} = \sigma_{33} = 0$$

where A is a constant.

(a) Calculate the body forces.

(b) Calculate the components σ_{rr} , $\sigma_{r\theta}$ at a point (a, θ) on a circle $r = a$ on the $x_1 x_2$ plane as a function of θ . (20%)

2. For a hollow circular cylinder of inner radius a and outer radius b, rotating with uniform angular velocity ω about its axis, calculate the cylindrical components of stress σ_{rr} , $\sigma_{\theta\theta}$, σ_{zz} , $\sigma_{r\theta}$, σ_{rz} , $\sigma_{\theta z}$. (20%)

3. Consider the four-bar truss as shown.

(a) Determine the element stiffness matrix for each element.

(b) Assemble the structural stiffness matrix for the entire truss.

(c) Modify the system stiffness matrix to account for the boundary conditions.

(d) Write the load vector. (20%)

