CEE6513 Computational Methods in Mechanics

Homework 6

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$$K = \begin{bmatrix} 2K_1 & -K_1 & 0 & \cdots & \cdots & \cdots & 0 & -K_1 \\ -K_1 & 2K_1 & -K_1 & 0 & \cdots & \cdots & \cdots & 0 \\ 0 & -K_1 & 2K_1 & -K_1 & 0 & \cdots & \cdots & 0 \\ \vdots & \vdots & \vdots & \vdots & \ddots & \vdots & \vdots & \vdots \\ \vdots & \vdots & \vdots & \vdots & \ddots & \vdots & \vdots & \vdots \\ \vdots & \vdots & \vdots & \vdots & \ddots & \vdots & \vdots & \vdots \\ 0 & \cdots & \cdots & \cdots & 0 & -K_1 & 2K_1 & -K_1 \\ -K_1 & 0 & \cdots & \cdots & \cdots & 0 & -K_1 & 2K_1 \end{bmatrix}$$

$$M = \begin{bmatrix} M_1 & 0 & 0 & \cdots & \cdots & \cdots & 0 \\ 0 & M_1 & 0 & \cdots & \cdots & \cdots & 0 \\ 0 & 0 & M_1 & 0 & \cdots & \cdots & 0 \\ \vdots & \vdots & \vdots & \vdots & \ddots & \vdots & \vdots \\ \vdots & \vdots & \vdots & \vdots & \ddots & \vdots & \vdots \\ \vdots & \vdots & \vdots & \vdots & \ddots & \vdots & \vdots \\ 0 & \cdots & \cdots & \cdots & 0 & 0 & M_1 \end{bmatrix}$$

$$\tilde{K}_{mm} = (2K_1) - e^{-ikmL_0}K_1 - e^{ikmL_0}K_1,$$

$$\tilde{M}_{mm} = M_1,$$

$$\tilde{K}_{mm}\tilde{u}_{mm} = \omega_m^2 \tilde{M}_{mm}\tilde{u}_{mm}$$

$$\omega_m^2 = \tilde{K}_{mm}/\tilde{M}_{mm}$$

$$\omega_m^2 = \left((2K_1) - e^{-ikmL_0}K_1 - e^{ikmL_0}K_1\right)/M_1.$$