

Matlab/Simulink program for Results comparison
between full ANSYS and reduced MOR simulations

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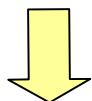
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Construction of the State-Space Model:

$$\begin{aligned} M\ddot{\mathbf{z}} + D\dot{\mathbf{z}} + K\mathbf{z} &= Bu \\ y &= C\mathbf{z} \end{aligned} \quad \left. \begin{array}{l} \\ y = C\mathbf{z} \end{array} \right\} \quad \xrightarrow{\text{blue arrow}} \quad \begin{aligned} \dot{\mathbf{z}} &= \mathbf{x}_1 \\ \mathbf{z} &= \mathbf{x}_2 \end{aligned} \quad \left. \begin{array}{l} \dot{\mathbf{z}} = \mathbf{x}_1 \\ \mathbf{z} = \mathbf{x}_2 \end{array} \right\} \quad \mathbf{x}$$

$$\begin{aligned} M\dot{\mathbf{x}}_1 + Dx_1 + Kx_2 &= Bu \\ y &= Cx_2 \end{aligned} \quad \left. \begin{array}{l} M\dot{\mathbf{x}}_1 + Dx_1 + Kx_2 = Bu \\ y = Cx_2 \end{array} \right\} \quad \xleftarrow{\text{blue arrow}}$$

$$\begin{aligned} \begin{bmatrix} M & O \\ O & I \end{bmatrix} \begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} + \begin{bmatrix} D & K \\ -I & O \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} &= \begin{bmatrix} B & O \\ O & O \end{bmatrix} \begin{bmatrix} u \\ 0 \end{bmatrix} \\ y &= \begin{bmatrix} 0 & C \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} \end{aligned}$$



$$\begin{aligned} \begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} &= \begin{bmatrix} M & O \\ O & I \end{bmatrix}^{-1} \begin{bmatrix} -D & -K \\ I & O \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} M & O \\ O & I \end{bmatrix}^{-1} \begin{bmatrix} B & O \\ O & O \end{bmatrix} \begin{bmatrix} u \\ 0 \end{bmatrix} \\ y &= \begin{bmatrix} 0 & C \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} \end{aligned}$$