

Report

Results:

Part 1 (Prelab)

Bond Graph

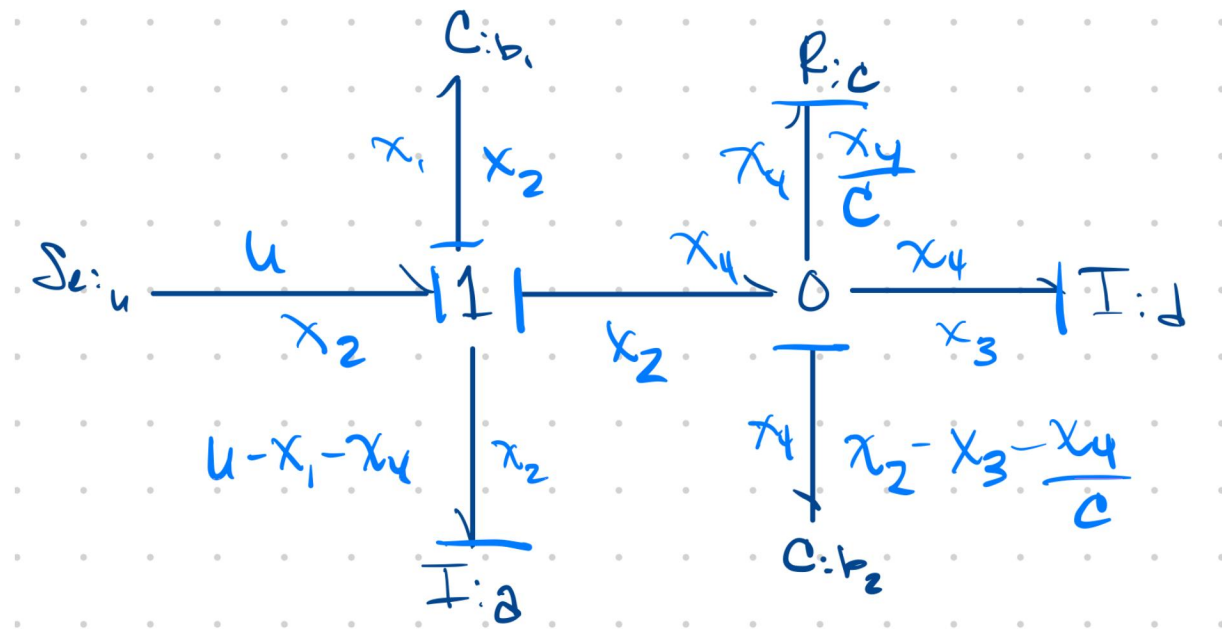


fig. 1 - Bond Graph

State Space Model

$$\dot{x} = \begin{bmatrix} 1/b_1 \cdot (x_2) \\ 1/a \cdot (u - x_1 - x_4) \\ 1/d \cdot (x_4) \\ 1/b_2 \cdot (x_2 - x_3 - x_4/c) \end{bmatrix} = \begin{bmatrix} 0 & 1/b_1 & 0 & 0 \\ -1/a & 0 & 0 & -1/a \\ 0 & 0 & 0 & 1/d \\ 0 & 1/b_2 & -1/b_2 & -1/cb_2 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix} + \begin{bmatrix} 0 \\ 1/a \\ 0 \\ 0 \end{bmatrix} u$$

$$y = \begin{bmatrix} 0 & 0 & 1 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix} + 0u$$

Given parameters:

$$a = 10e^{-4}; b = 1e^{-6}; c = 100; d = 40e^{-3}$$