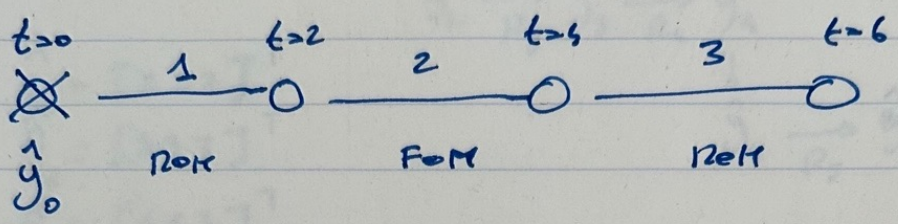
MIXED FOM - ROM (LSPG) with BDF1



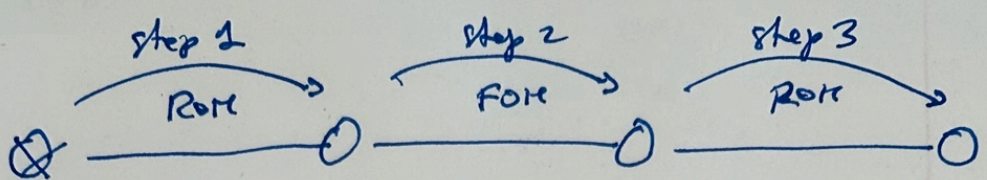
- $\phi = \begin{bmatrix} 1 & 2 & 3 \end{bmatrix}$, $h = 2$ (time step size), $\hat{y}_0^1 = \begin{bmatrix} 2 \\ 2 \\ 2 \end{bmatrix}$ initial ROM state

- FOM size = 8

- f() always returns $\begin{bmatrix} 1 \\ 1 \\ \vdots \\ 1 \end{bmatrix}$

- solver is fake and takes a step adds 1 (just mimics some modification)

MAIN1_BDF1.cc



$\hat{y}_0 \xrightarrow{R_1} \hat{y}_1 \xrightarrow{R_2} \hat{y}_2 \downarrow$

$y_2 \xrightarrow{R_3} y_3 \xrightarrow{R_4} y_4 \downarrow$

$\hat{y}_4 \xrightarrow{R_5} \hat{y}_5 \xrightarrow{R_6} \hat{y}_6$

$\hat{y}_0 = [2\,2\,2]^T$

$\hat{y}_1 = [3\,3\,3]^T$

$\hat{y}_2 = [4\,4\,4]^T$

$y_2 = \phi \hat{y}_2 = [24 \dots 24]^T$

$y_3 = [25 \dots 25]^T$

$y_4 = [26 \dots 26]^T$

$\hat{y}_4 = \phi^T y_4 = \begin{bmatrix} 208 \\ 416 \\ 624 \end{bmatrix}$

$\hat{y}_5 = \begin{bmatrix} 209 \\ 417 \\ 625 \end{bmatrix}$

$\hat{y}_6 = \begin{bmatrix} 210 \\ 418 \\ 626 \end{bmatrix}$

$R_1 = \cancel{\phi \hat{y}_0} - \cancel{\phi \hat{y}_0} - h\dot{\phi} = [-2\,-2 \dots -2]^T$

$R_2 = \phi \hat{y}_1 - \phi \hat{y}_0 - h\dot{\phi} = [4\,4 \dots 4]^T$

$R_3 = \cancel{\phi \hat{y}_2} - \cancel{\phi \hat{y}_2} - h\dot{\phi} = [-2\,-2 \dots -2]^T$

$R_4 = y_3 - \phi \hat{y}_2 - h\dot{\phi} = [-1\,-1 \dots -1]^T$

$R_5 = \phi\phi^T y_4 - \phi\phi^T y_4 - h\dot{\phi} = [-2 \dots -2]^T$

$R_6 = \phi \hat{y}_5 - \phi\phi^T y_4 - h\dot{\phi} = [4\,4 \dots 4]^T$