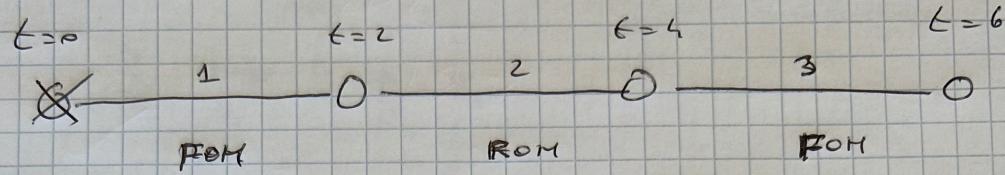


MIXED FOK-NOM DEFAULT CALCFUN BDF1



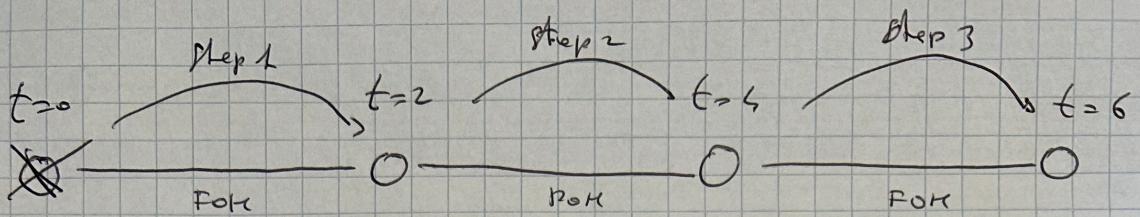
$$\phi = \begin{bmatrix} 1 & 2 & 3 \\ 1 & 2 & 3 \\ \vdots & \vdots & \vdots \\ \vdots & \vdots & \vdots \end{bmatrix}, \quad h = 2 \text{ (dt)}, \quad y_0 = \begin{bmatrix} 10 \\ 10 \\ \vdots \\ 10 \end{bmatrix}$$

initial form state

FOK size = 8

$f(y,t) = \text{always } y + t$

MAIN2\_BDF1.cc



$$y_0 \xrightarrow{R_1} y_1 \xrightarrow{R_2} y_2$$

$$y_0 = [10 10 \dots 10]^T$$

$$y_1 = [11 11 \dots 11]^T$$

$$y_2 = [12 12 \dots 12]^T$$

$$\hat{y}_2 = \phi^T y_2 = [96 \ 192 \ 288]$$

$$\hat{y}_3 = [97 \ 193 \ 289]$$

$$\hat{y}_4 = [98 \ 194 \ 290]$$

$$y_4 = \phi^T \hat{y}_4 = [1356 \ \dots \ 1356]$$

$$y_5 = [1357 \ \dots \ 1357]$$

$$y_6 = [1358 \ \dots \ 1358]$$

$$R_1 = \cancel{y_0} - y_0 - h f = -h f(y_0, t=0) = [-24 \ \dots \ -24]^T$$

$$R_2 = y_1 - \cancel{y_0} - h f = y_1 [1 \ \dots \ 1]^T - h f(y_1, t=1) = [-25 \ \dots \ -25]^T$$

$$R_3 = \cancel{\hat{y}_2} - \hat{y}_2 - h \phi^T f(t=2, \phi \hat{y}_2) = -h \phi^T (\phi \phi^T \hat{y}_2 + \epsilon) = \begin{bmatrix} -21568 \\ -43136 \\ -65704 \end{bmatrix}$$

$$R_4 = \cancel{\hat{y}_3} - \hat{y}_3 - h \phi^T f(t=3, \phi \hat{y}_3) = [1 \ 1 \ 1]^T - h \phi^T (\phi \phi^T \hat{y}_3 + \epsilon) = \begin{bmatrix} -21663 \\ -43328 \\ -65992 \end{bmatrix}$$

$$R_5 = \cancel{y_6} - y_6 - h f = -h f(\phi \hat{y}_4, t=6) = [-2724 \ \dots \ -2724]^T$$

$$R_6 = y_5 - \cancel{y_4} - h f = [1 \ \dots \ 1]^T - h f(y_5, t=5) = [-2725 \ \dots \ -2725]$$