

$$\begin{aligned}
 &\mathbf{x}_{t+1} \\
 &\approx \begin{bmatrix} (\Delta t A + I) & \Delta t B & \Delta t C \end{bmatrix} \phi^x \left(\begin{bmatrix} \mathbf{x}_t \\ \mathbf{u}_t \end{bmatrix} \right) \quad \text{where} \quad \phi^x \left(\begin{bmatrix} \mathbf{x}_t \\ \mathbf{u}_t \end{bmatrix} \right) = \begin{bmatrix} \mathbf{x}_t \\ \mathbf{u}_t \otimes \mathbf{x}_t \end{bmatrix} \\
 &\equiv \begin{bmatrix} W^{xx} & W^{xu} \end{bmatrix} \phi^x \left(\begin{bmatrix} \mathbf{x}_t \\ \mathbf{u}_t \end{bmatrix} \right)
 \end{aligned}$$