

IV.7 Place uuv equations in state-space form

$$x = \begin{bmatrix} \phi \\ \dot{\phi} \end{bmatrix} \quad u = \tau(t) \quad y = \phi$$

From IV.5 :

$$\dot{\phi} = \dot{\phi}$$

$$\ddot{\phi} = -\frac{b}{J}\dot{\phi} - \frac{mgL}{J}\phi + \frac{1}{J}\tau(t)$$

$$\begin{bmatrix} \dot{\phi} \\ \ddot{\phi} \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ -\frac{mgL}{J} & -\frac{b}{J} \end{bmatrix} \begin{bmatrix} \phi \\ \dot{\phi} \end{bmatrix} + \begin{bmatrix} 0 \\ \frac{1}{J} \end{bmatrix} \tau(t)$$

$$y = \begin{bmatrix} 1 & 0 \end{bmatrix} \begin{bmatrix} \phi \\ \dot{\phi} \end{bmatrix} + 0 \tau(t)$$

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