Nitin Kapania
Neural Network Feedforward

Ignoring state history, we have:

$$\dot{U_y}, \dot{r} = f(r, U_y, U_x, \delta, F_x) \tag{1}$$

Can we do this? Predict just one of the states $\dot{U_y}$ or $\dot{r}$ from the net.

$$\dot{r} = f(r, U_y, U_x, \delta, F_x) \tag{2}$$

$$\dot{U_y} = f(r, U_y, U_x, \delta, F_x) \tag{3}$$

For $\dot{r}$, obtain by setting $\Delta\ddot{\Psi}$ to 0:

$$\Delta\dot{\Psi} = r - KU_x \tag{4}$$
$$\Delta\ddot{\Psi} = \dot{r} - K\dot{U_x} - \dot{K}U_x \tag{5}$$
$$\dot{r}_{des} = K\dot{U_x} + \dot{K}U_x \tag{6}$$

For $\dot{U_y}$, set $\ddot{e}$ to 0:

$$\dot{e} = U_y + U_x\Delta\Psi \tag{7}$$
$$\ddot{e} = \dot{U_y} + \dot{U_x}\Delta\Psi + U_x\Delta\dot{\Psi} \tag{8}$$
$$\dot{U_y}_{des} = -U_x(r - \kappa U_x) - \dot{U_x}\Delta\Psi \tag{9}$$

Then solve for δ through zero-finding.