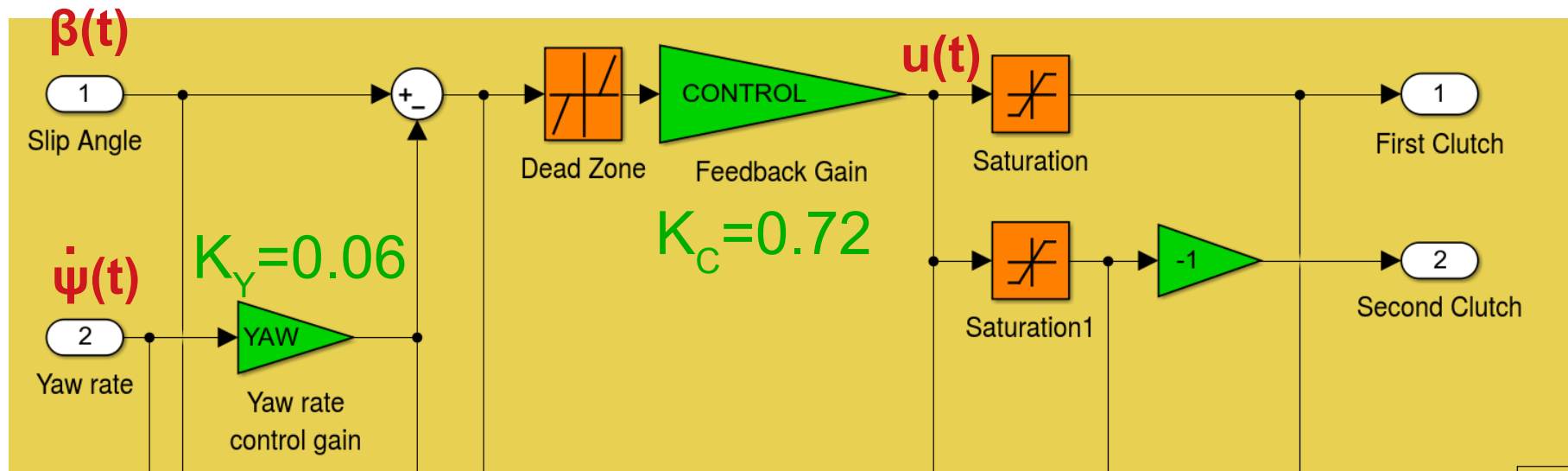


KN Yaw Control implementation in CarSim 2019.0

- References:
 - Dataset “*Yaw Control Diff., DLC w/ Low Mu*” from *Simulink and LabVIEW Models* subset

CarSim original Yaw Control



$$u(t) = K_C \beta(t) - K_C K_Y \dot{\psi}(t)$$

KN Yaw Control

- KN control to be implemented

$$u(t) = K_{\beta} [\beta_{ref}(t) - \beta(t)] + K_{\psi} [\dot{\psi}_{ref}(t) - \dot{\psi}(t)]$$

- Parameters to be tuned in sign and value:

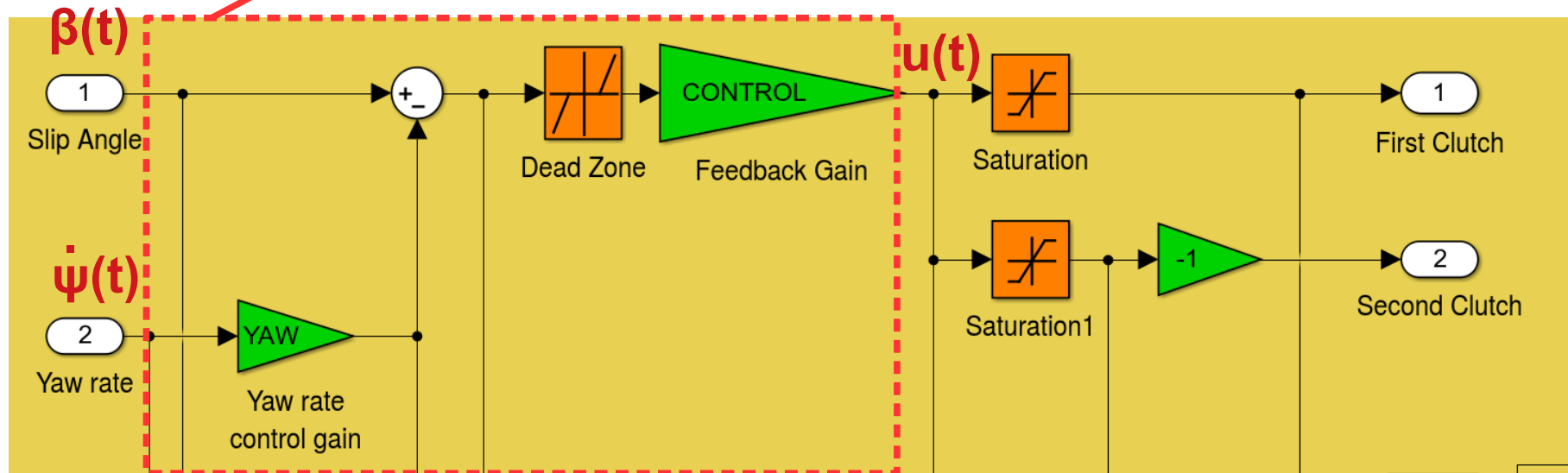
- gains K_{β} and K_{ψ}

- Because $V_{CoG,ref}$ is not defined, suppose

$$K_{VCoG} = 0$$

CarSim control modification

$$u(t) = K_C \beta(t) - K_C K_Y \dot{\psi}(t)$$



- Substitute with:

$$u(t) = K_{\beta} [\beta_{ref}(t) - \beta(t)] + K_{\psi} [\dot{\psi}_{ref}(t) - \dot{\psi}(t)]$$

KN control tuning

- Use polynomial identity to guess a starting value for gains K_β and $K_{\dot{\psi}}$

$$\begin{aligned} u_{CS}(t) &= +K_C \beta(t) - K_C K_Y \dot{\psi}(t) \\ u_{KN}(t) &= -K_\beta \beta(t) - K_{\dot{\psi}} \dot{\psi}(t) + \\ &\quad + K_\beta \beta_{ref}(t) + K_{\dot{\psi}} \dot{\psi}_{ref}(t) \end{aligned}$$