

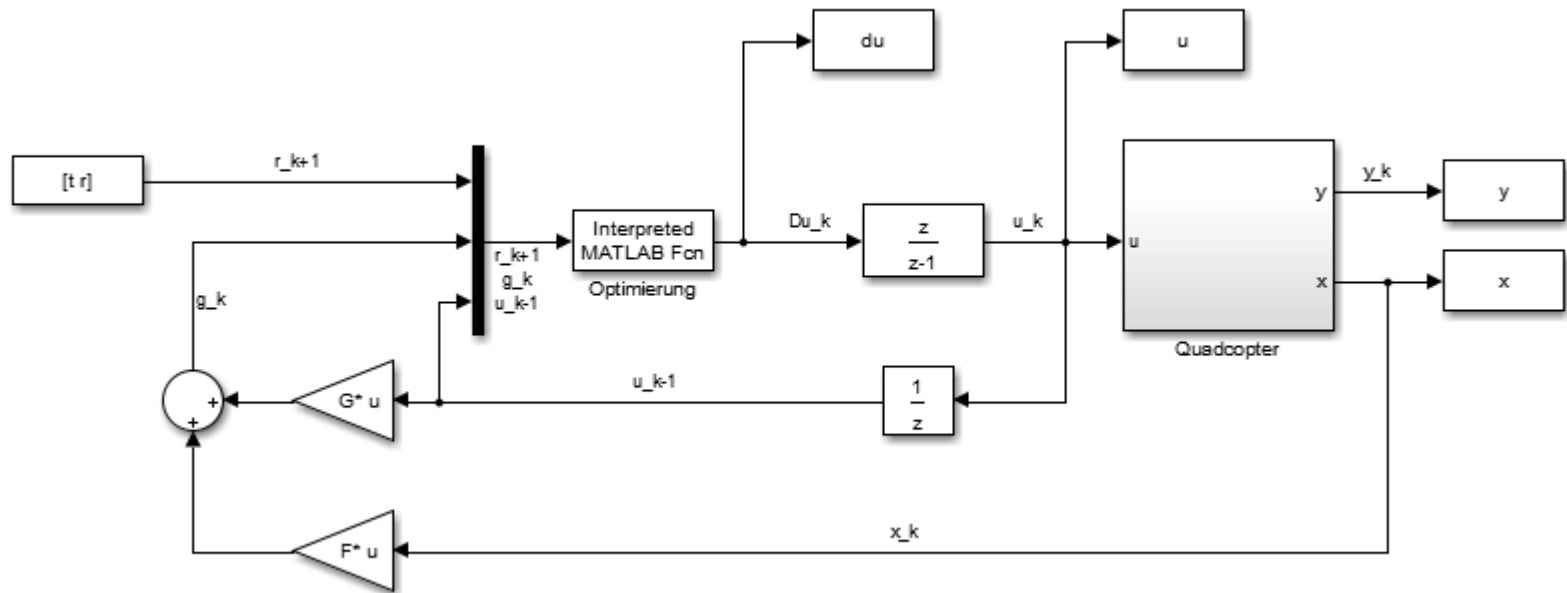
# MPC: Quadcopter constrained

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**Institute of Automation and Control**

WS 2021/22

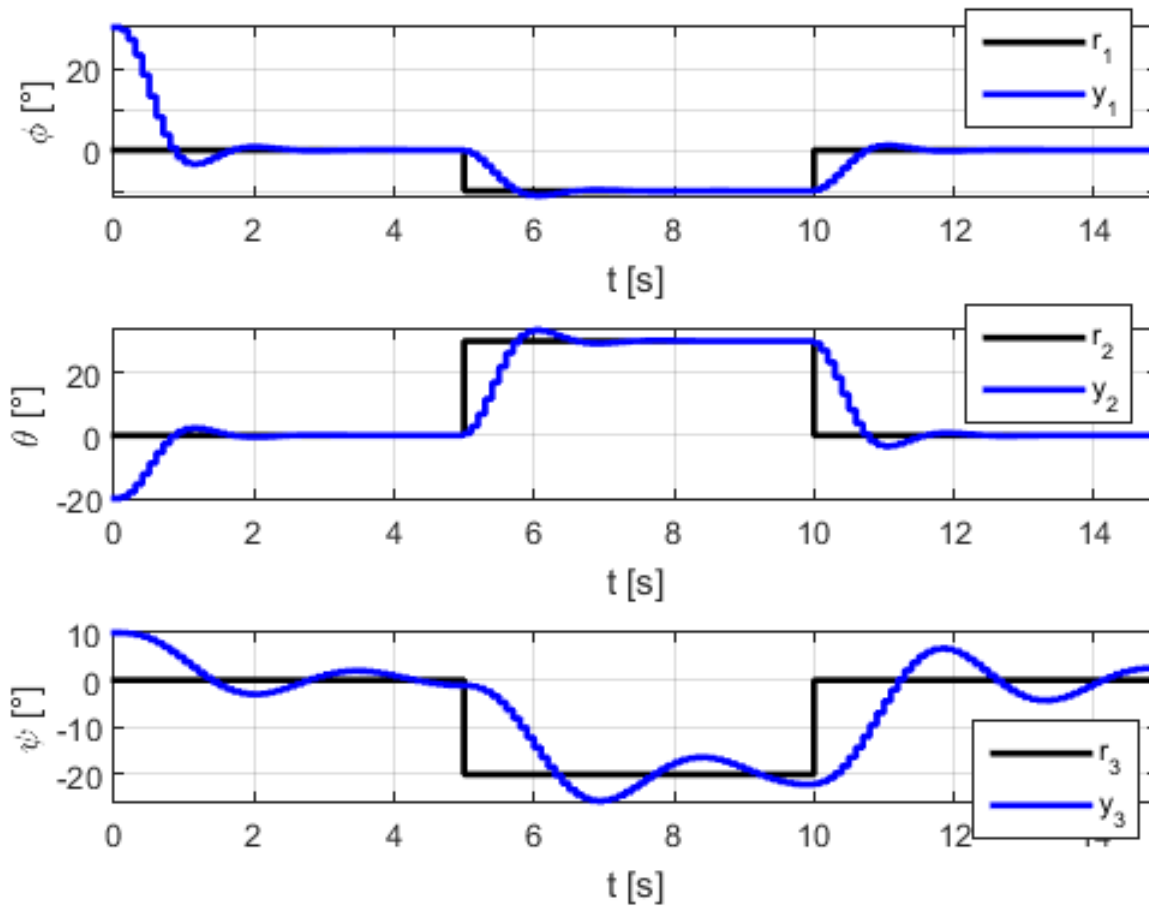
# Simulink

# Feedback loop

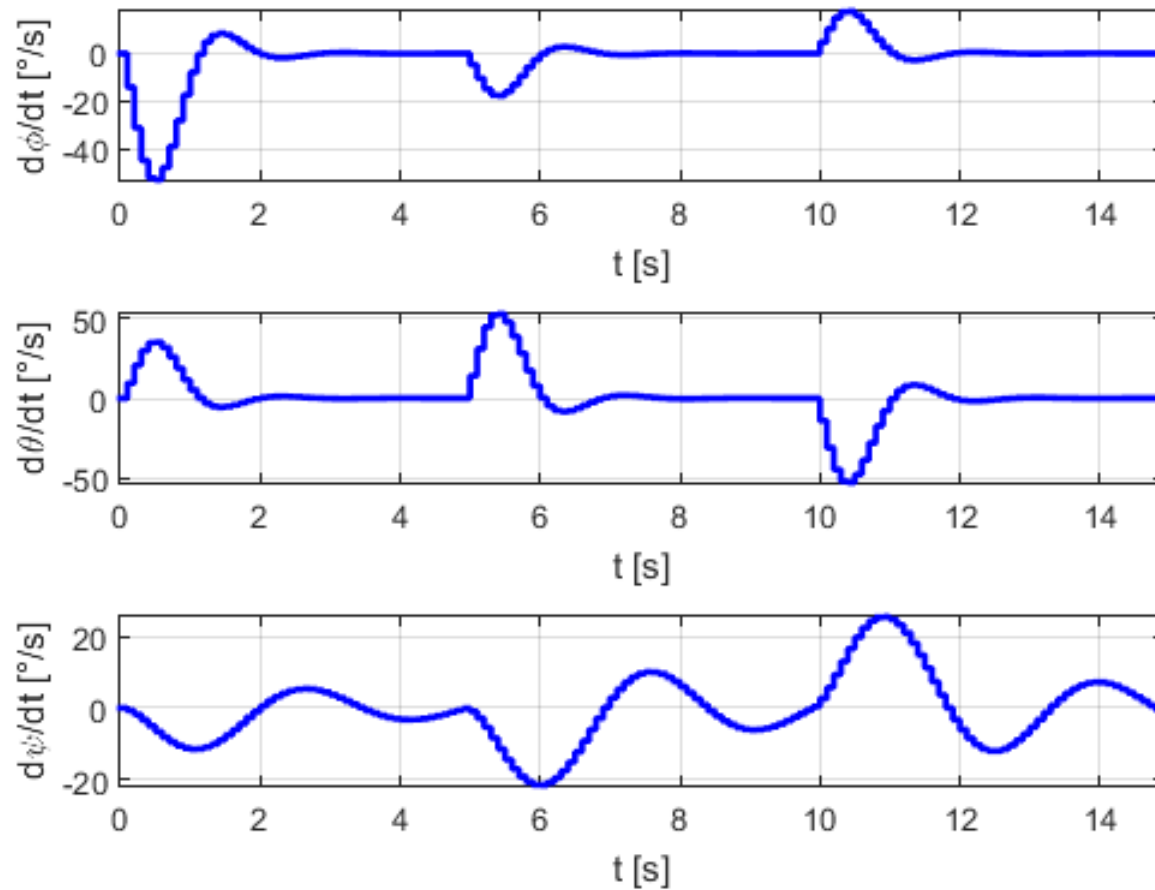


# Nominal case without constraints

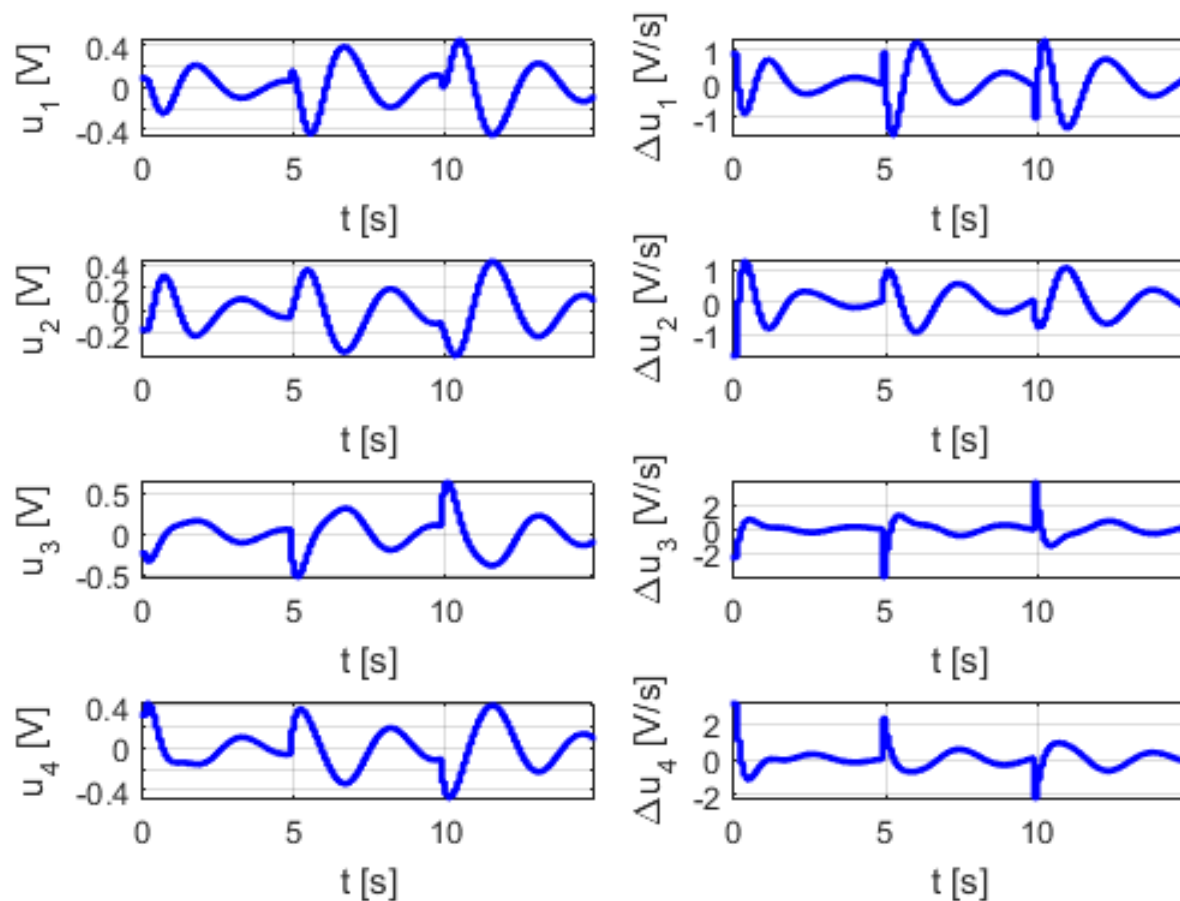
$$N_P=10, N_C=5, Q_i=E, R_i=E$$



$$N_P=10, N_C=5, Q_i=E, R_i=E$$



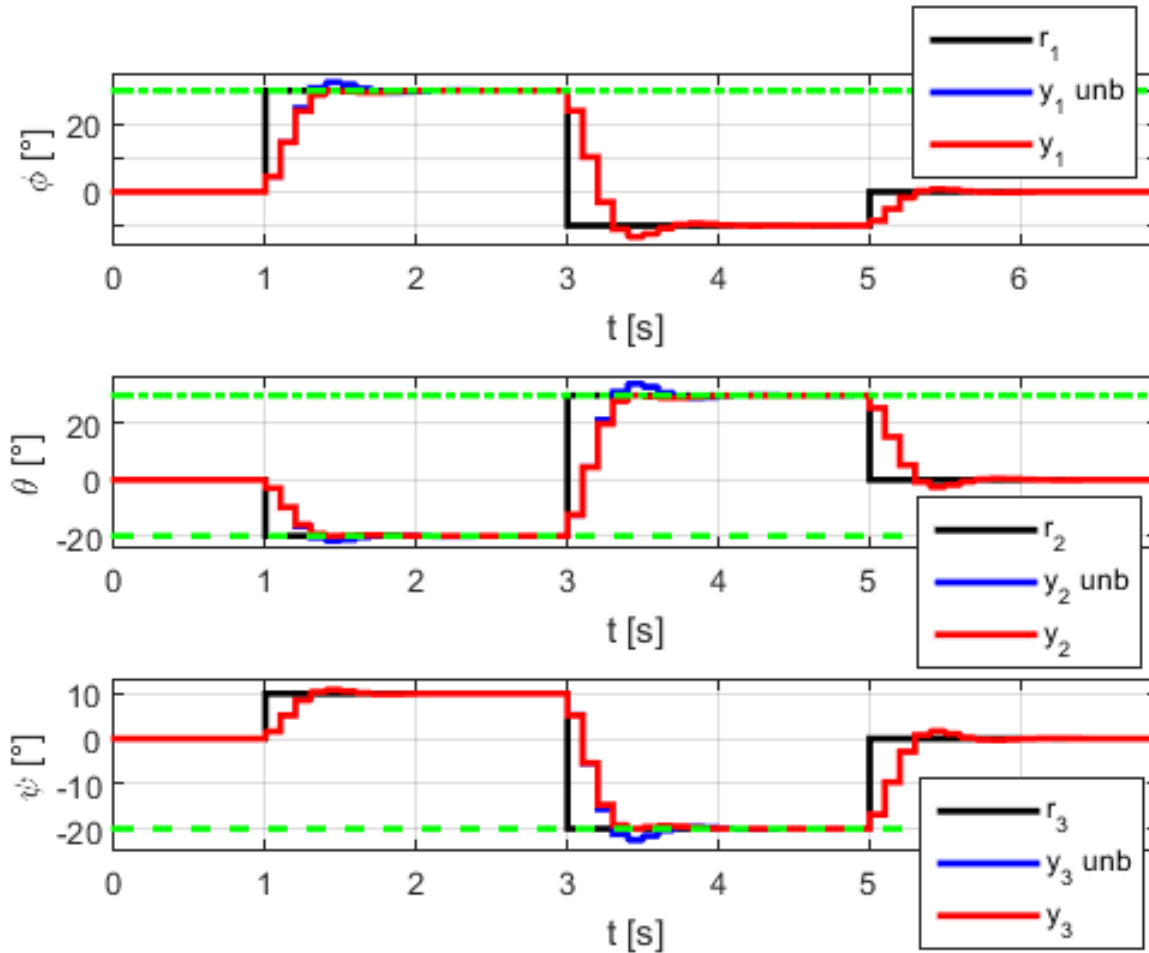
$$N_P=10, N_C=5, Q_i=E, R_i=E$$



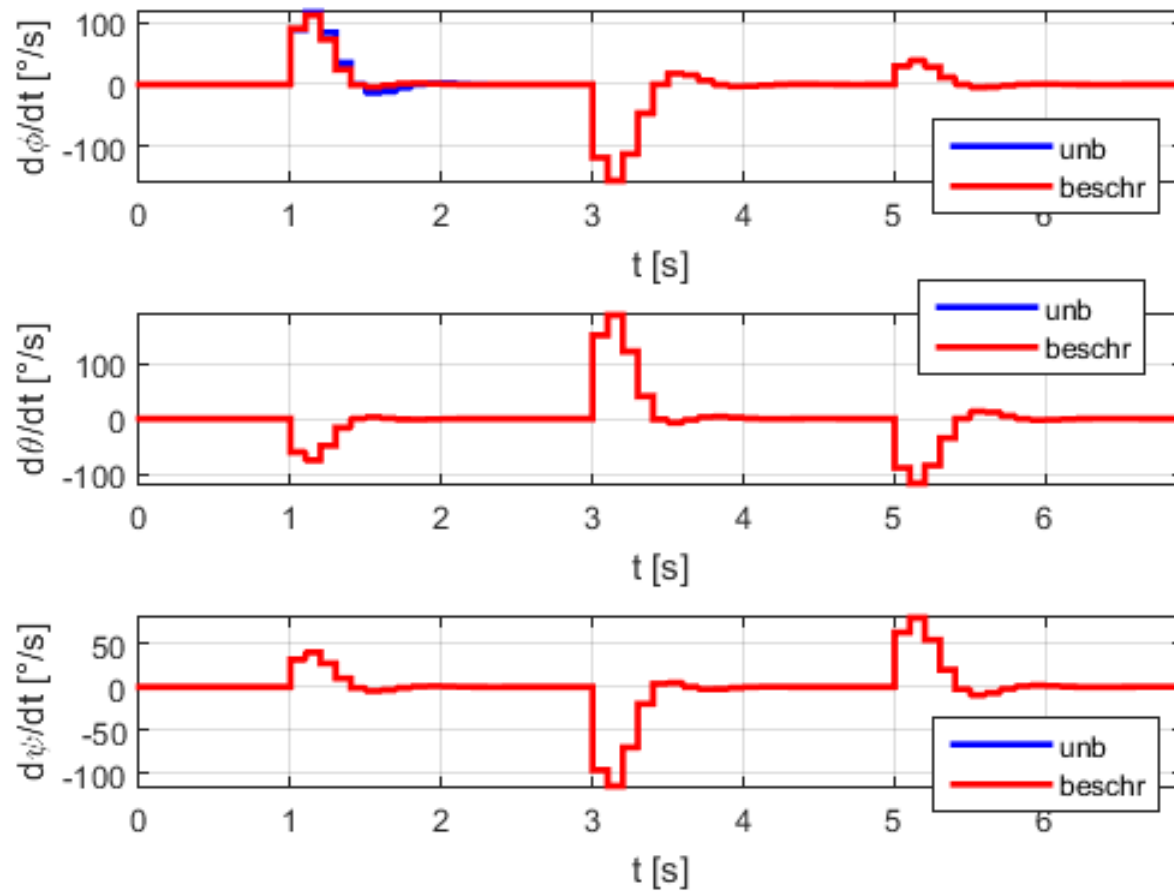
# With constraints



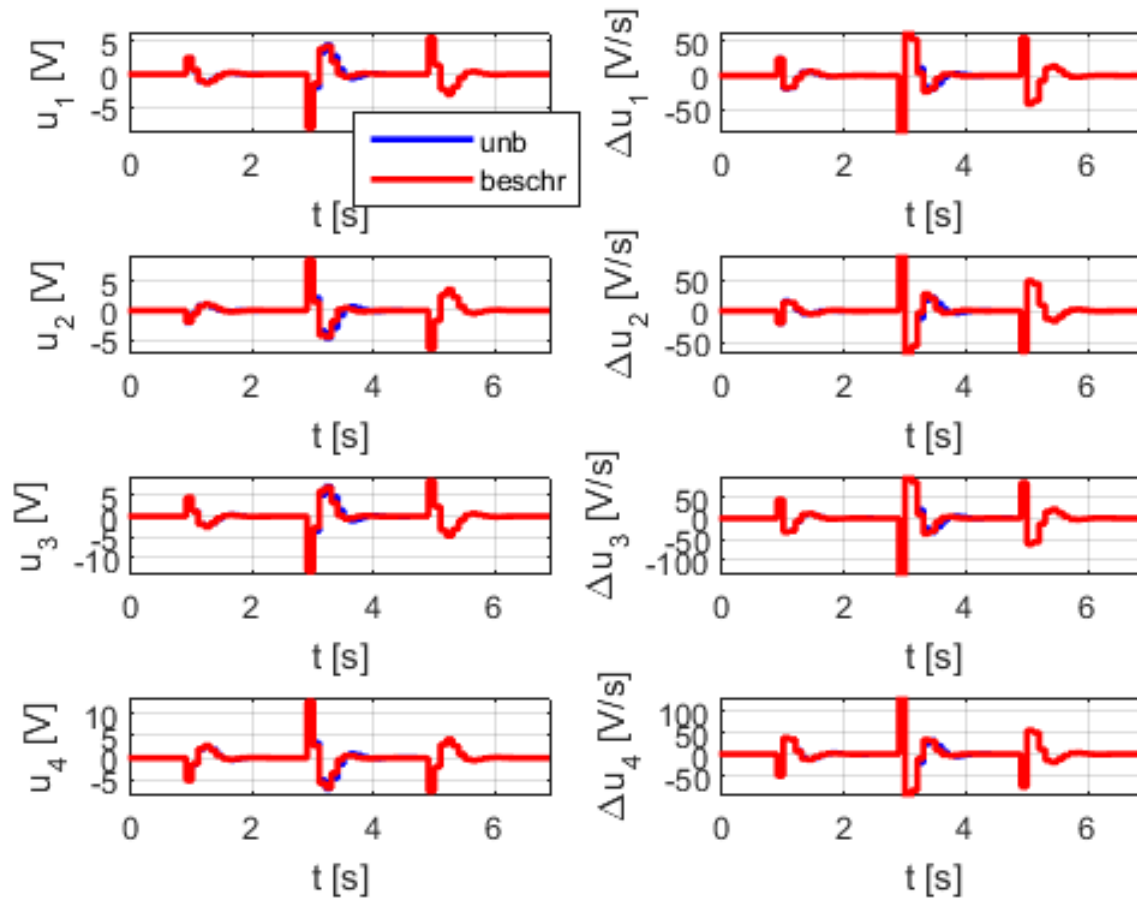
$$y_{\max}=30^{\circ} \quad y_{\min}=-20^{\circ}$$



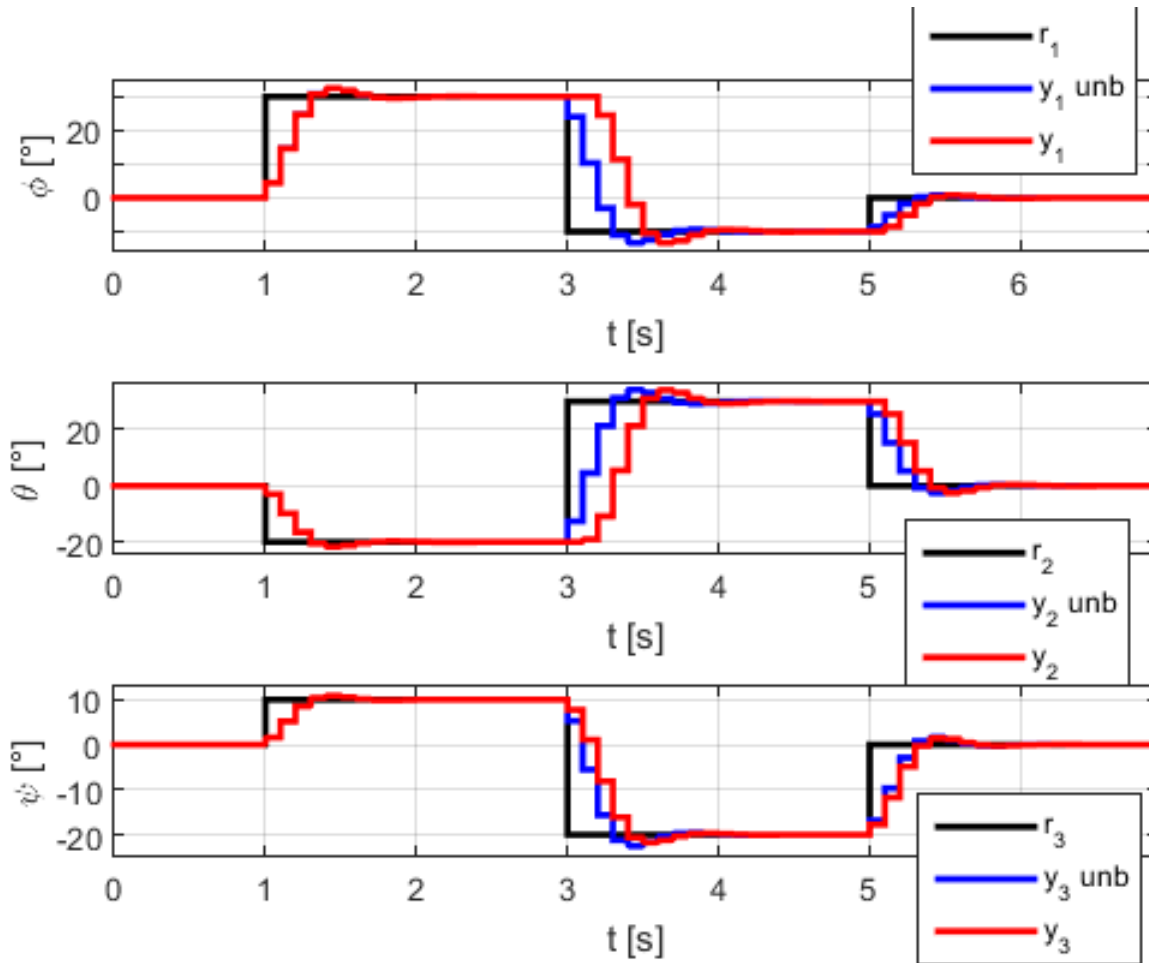
$$y_{\max}=30^{\circ} \quad y_{\min}=-20^{\circ}$$



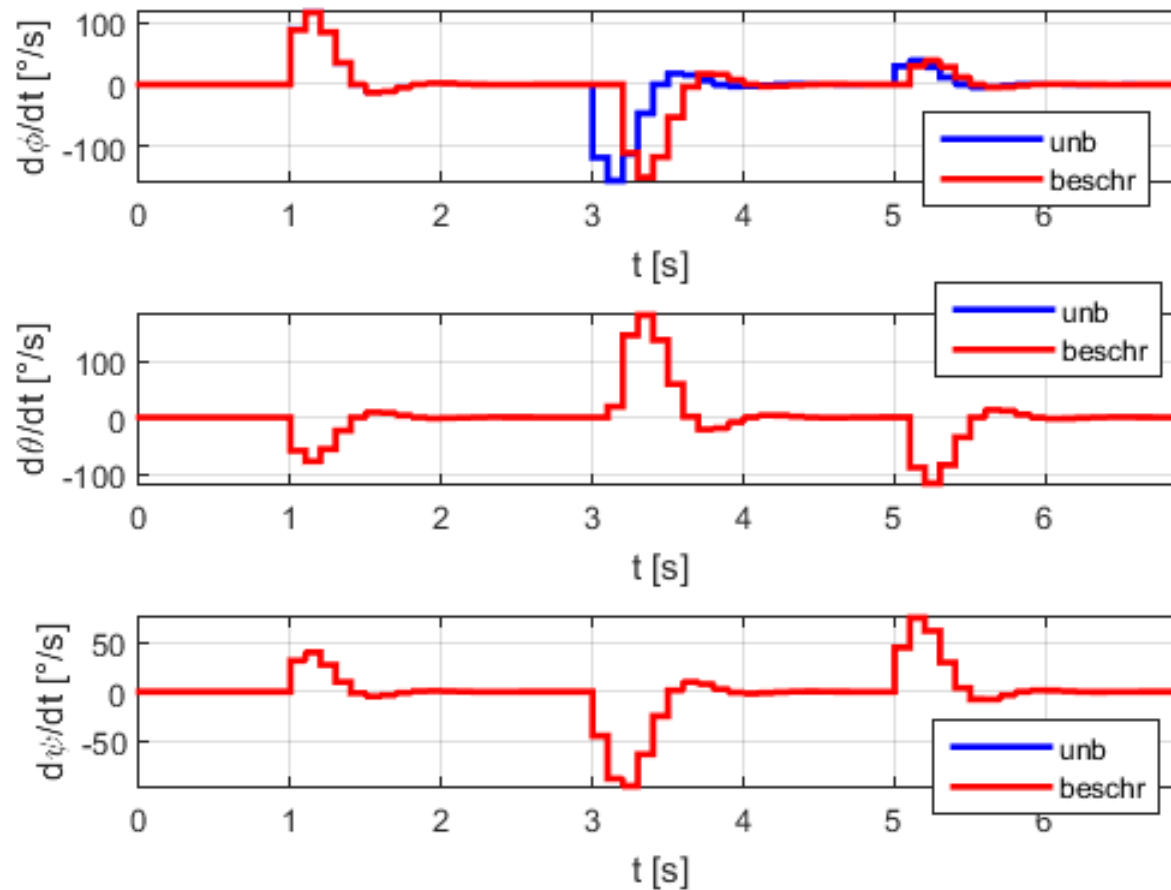
$$y_{\max}=30^{\circ} \quad y_{\min}=-20^{\circ}$$



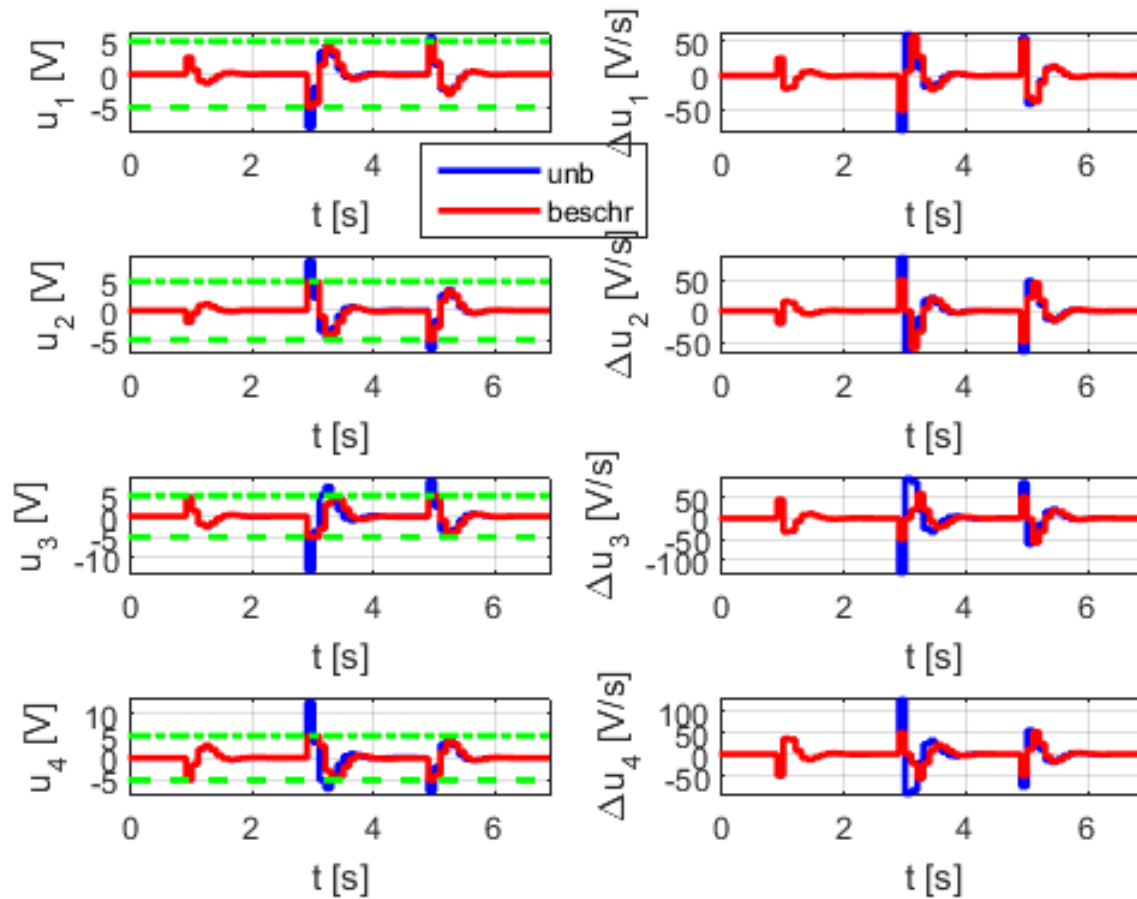
$$u_{\max}=5V \quad u_{\min}=-5V$$



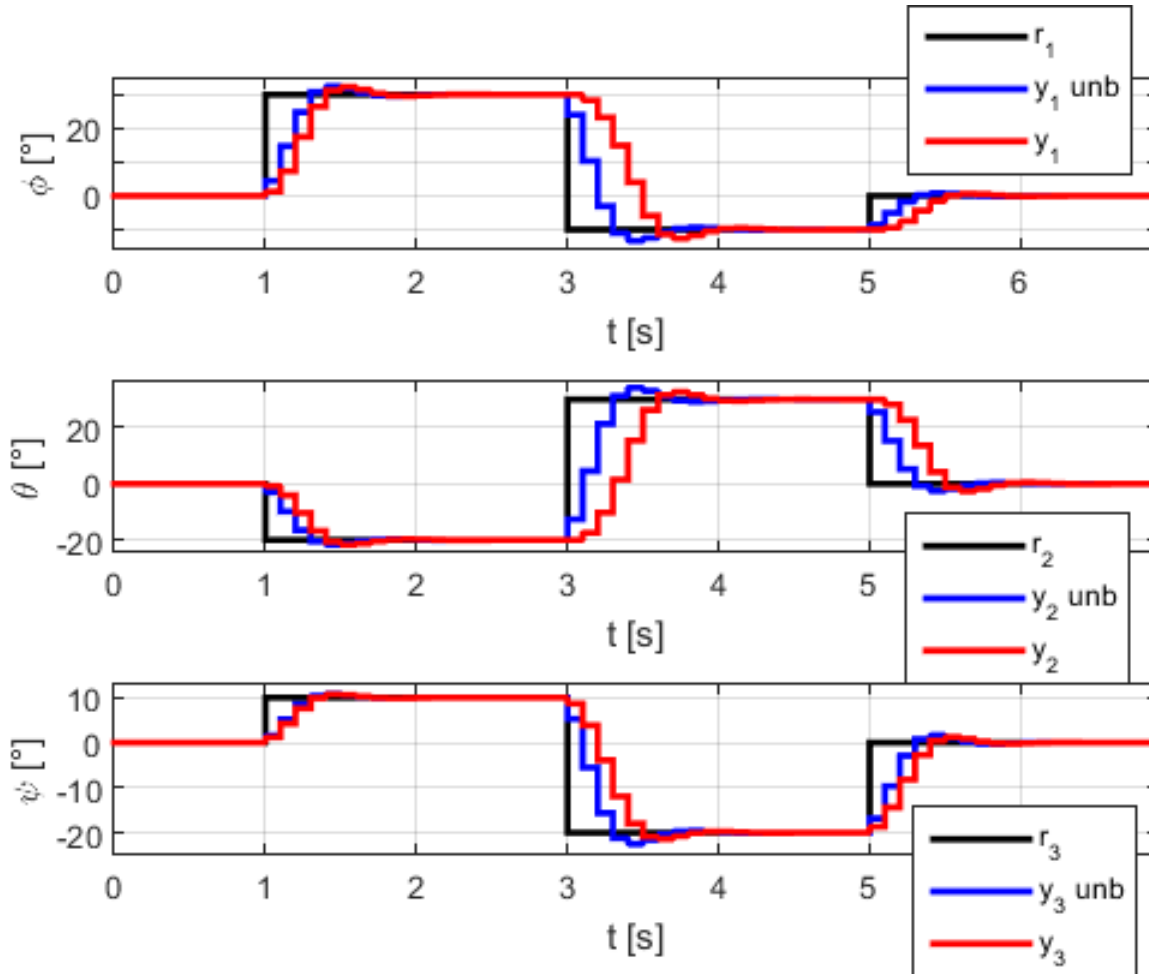
$$u_{\max}=5V \quad u_{\min}=-5V$$



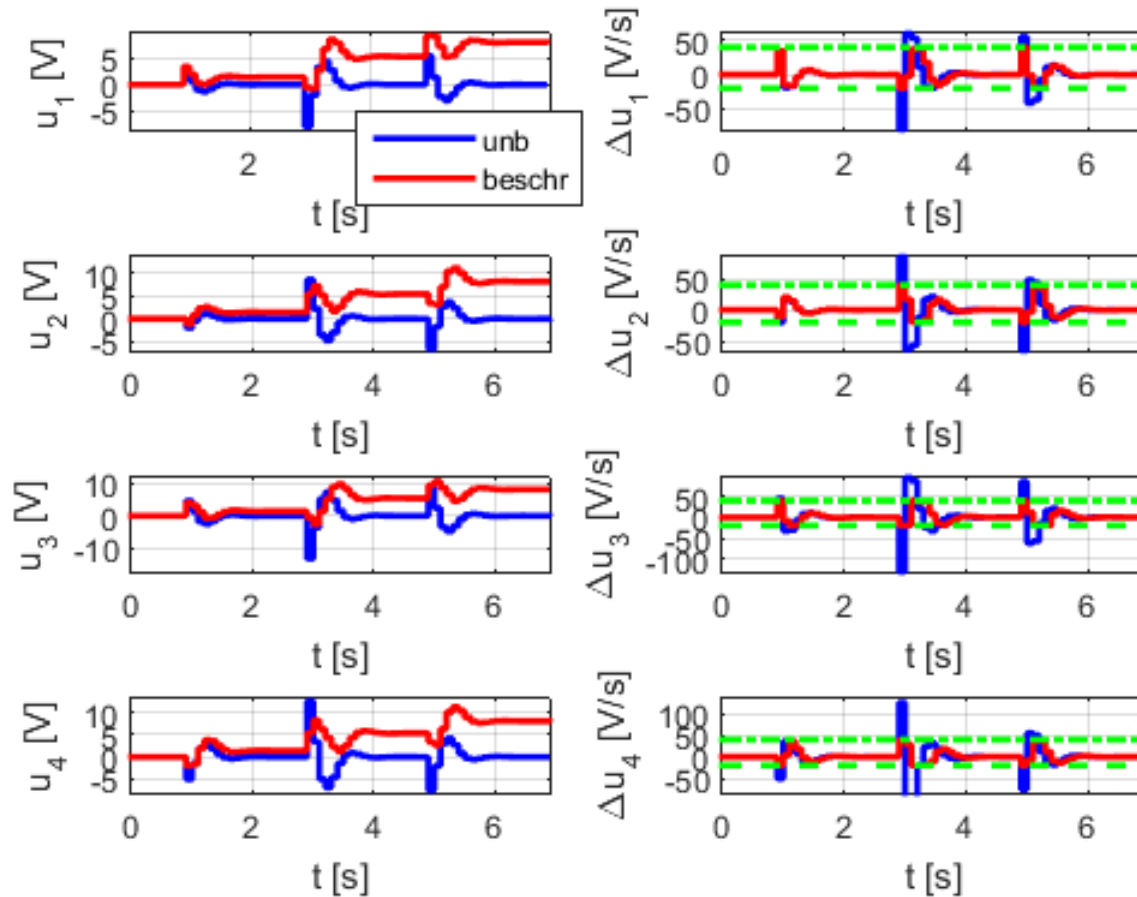
$$u_{\max}=5V \quad u_{\min}=-5V$$



$$\Delta u_{\max} = 40 \text{ V/s} \quad \Delta u_{\min} = -20 \text{ V/s}$$

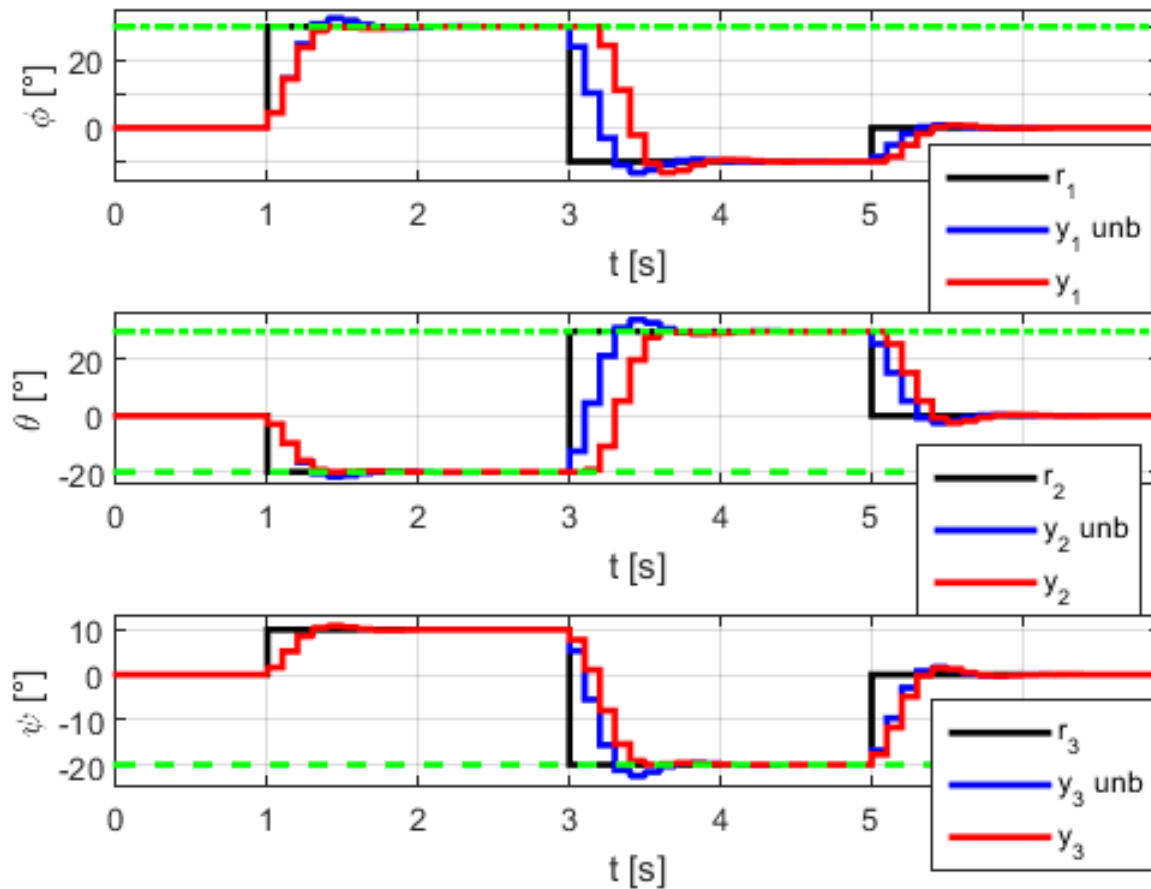


$$\Delta u_{\max} = 40 \text{ V/s} \quad \Delta u_{\min} = -20 \text{ V/s}$$

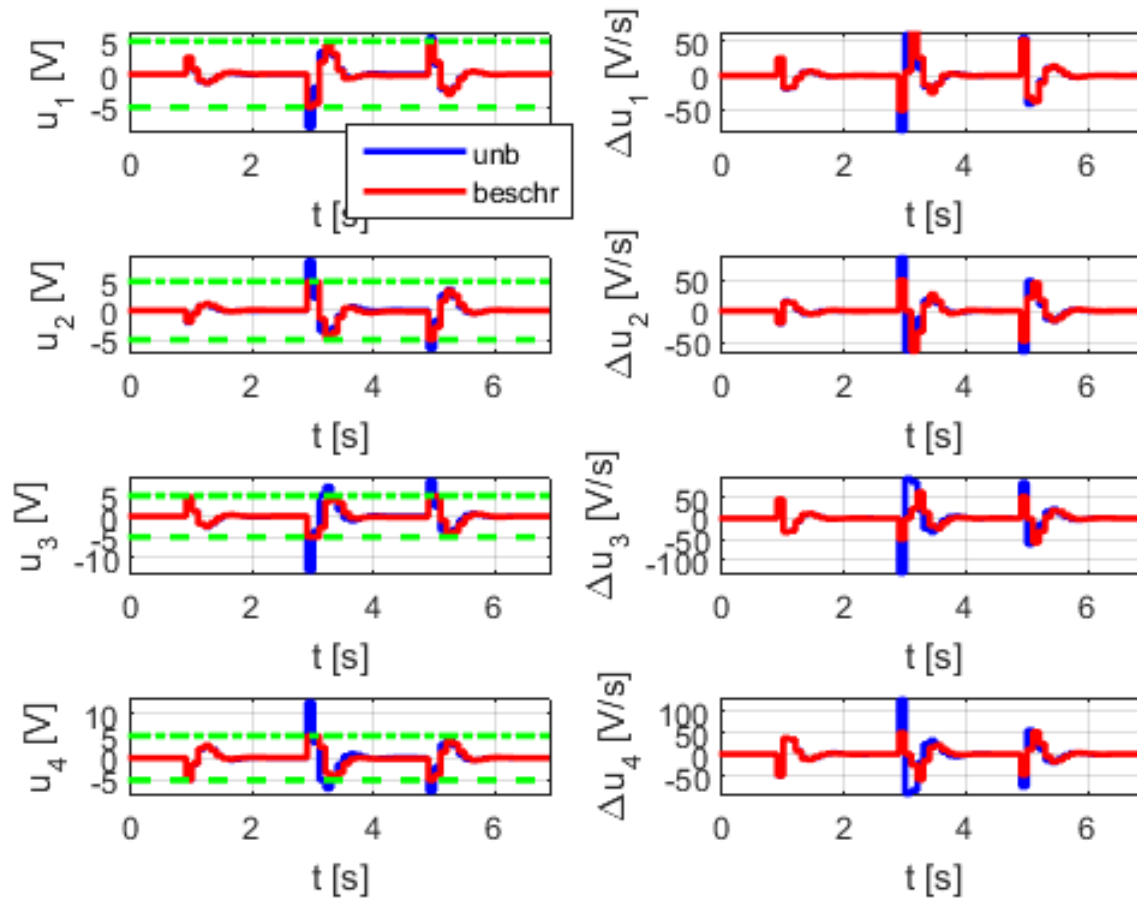




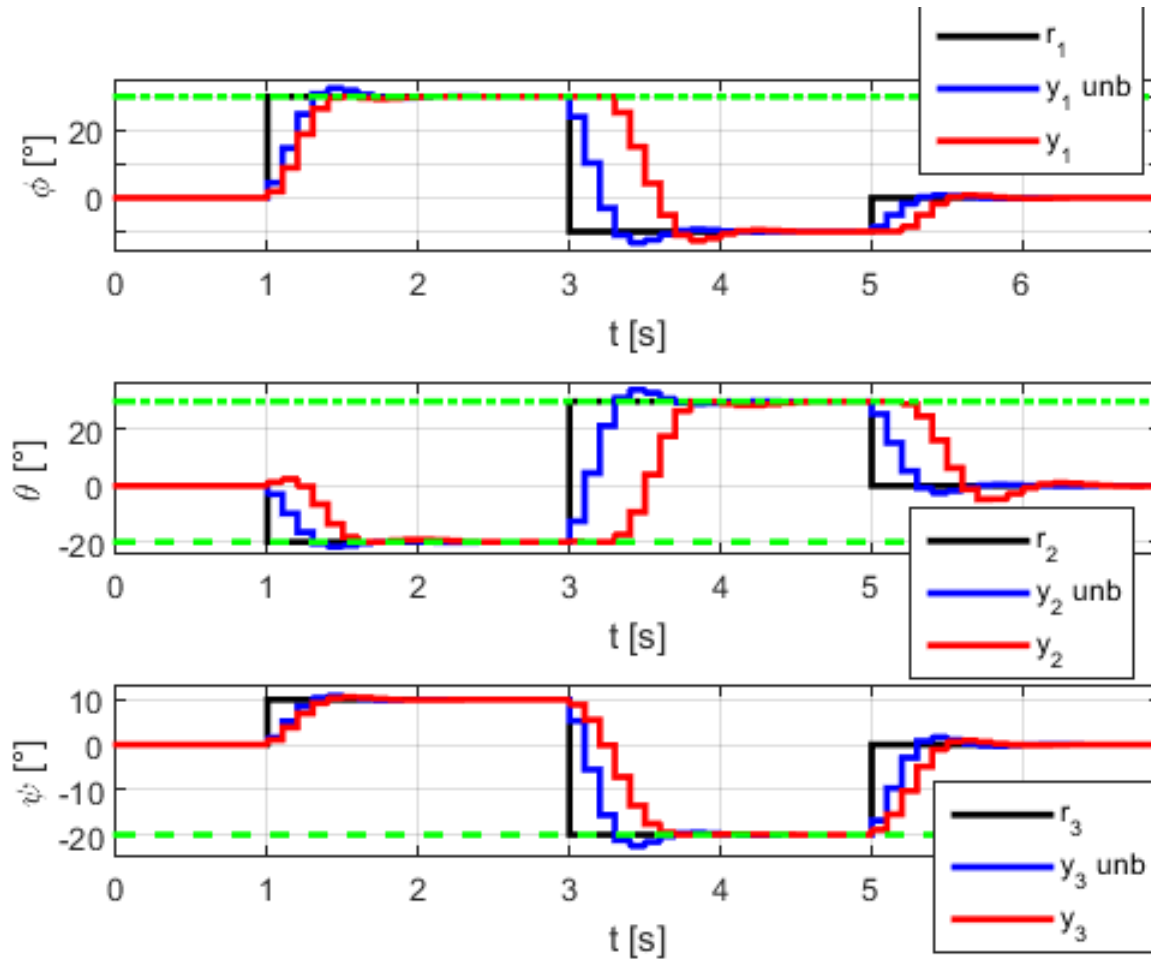
$$y_{\max}=30^{\circ} \quad y_{\min}=-20^{\circ} \quad u_{\max}=5V \quad u_{\min}=-5V$$



$$y_{\max}=30^{\circ} \quad y_{\min}=-20^{\circ} \quad u_{\max}=5V \quad u_{\min}=-5V$$



# Failure of one actuator



# Failure of one actuator

