

Fall 2022 (111-1)

控制系統
Control Systems

Unit 1E
Motivating Example of
Feedback and Feedforward Controls

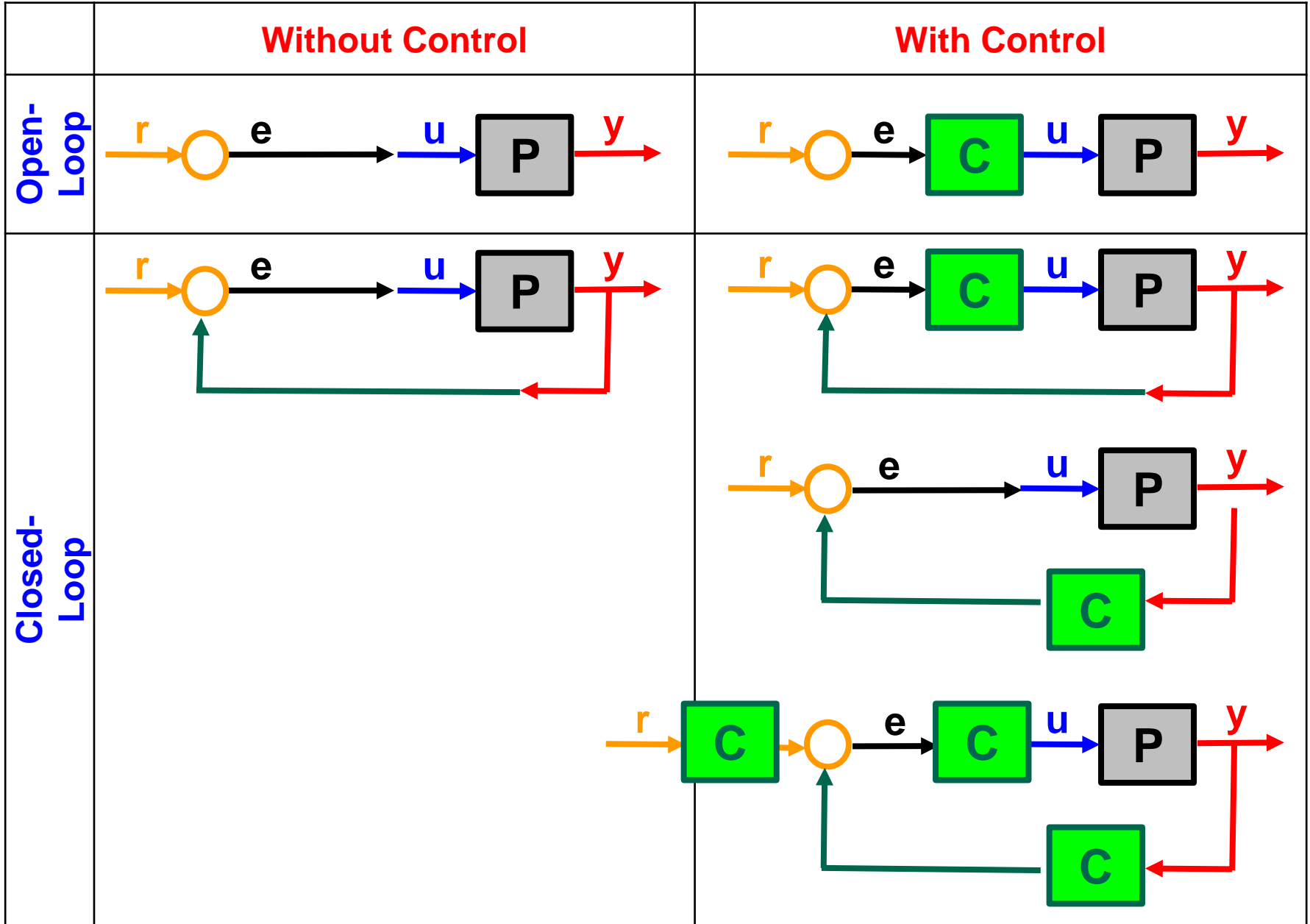
Feng-Li Lian

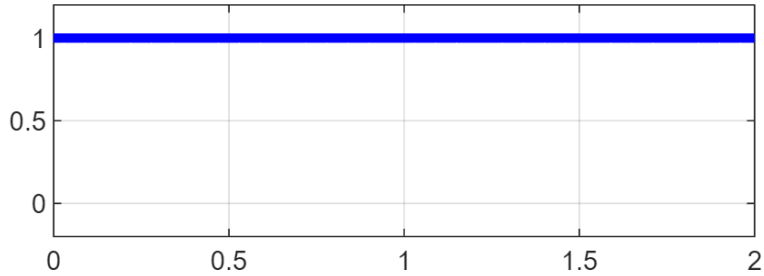
NTU-EE

Sep 2022 – Dec 2022

Control

Feedback





$$G(s) = \frac{1}{s(s+1)}$$

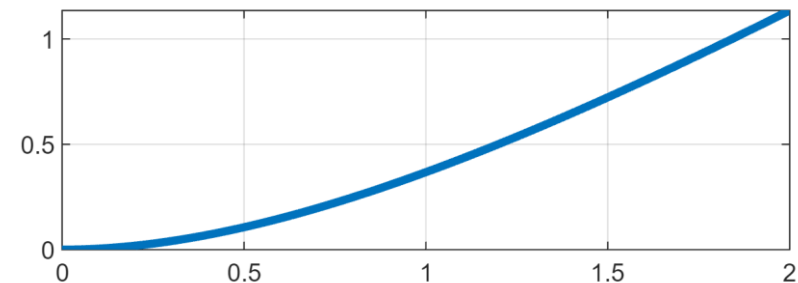
$$u(t) = 1(t)$$

$$U(s) = \frac{1}{s}$$

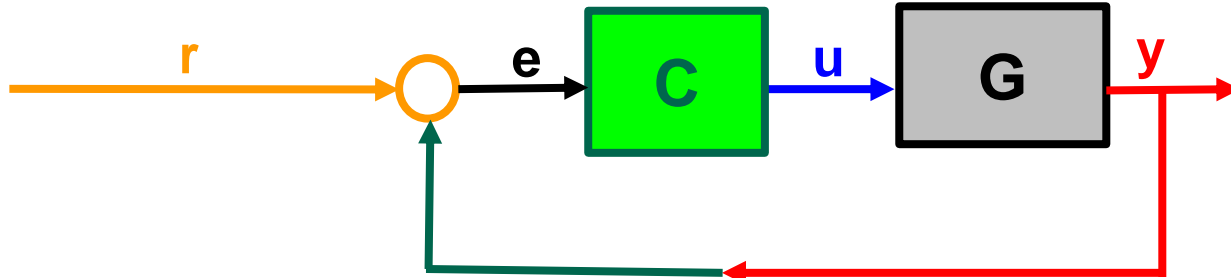
$$Y(s) = \frac{1}{s(s+1)} \frac{1}{s}$$

$$= \frac{(-1)}{s} + \frac{(1)}{s^2} + \frac{(-1)}{s+1}$$

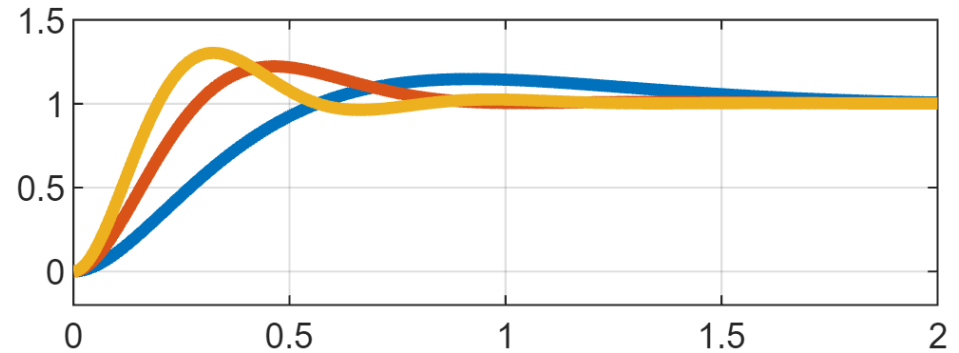
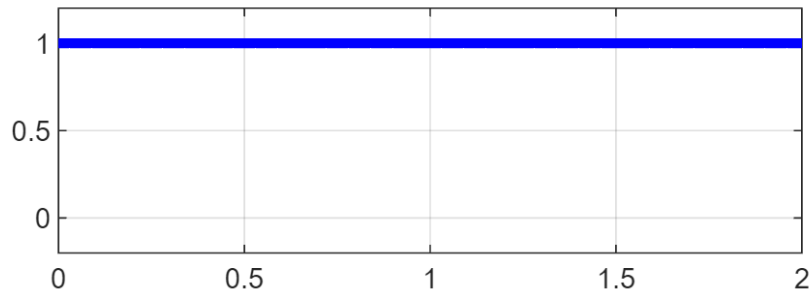
$$y(t) = (-1) + t + e^{-t}$$



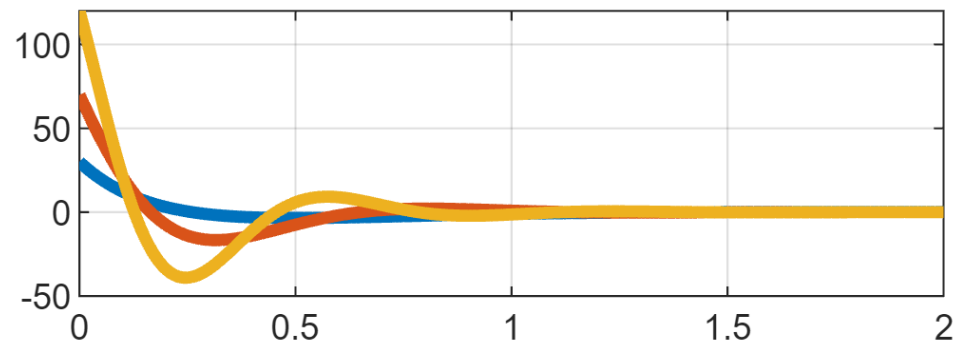
Feedback and Feedforward Controls

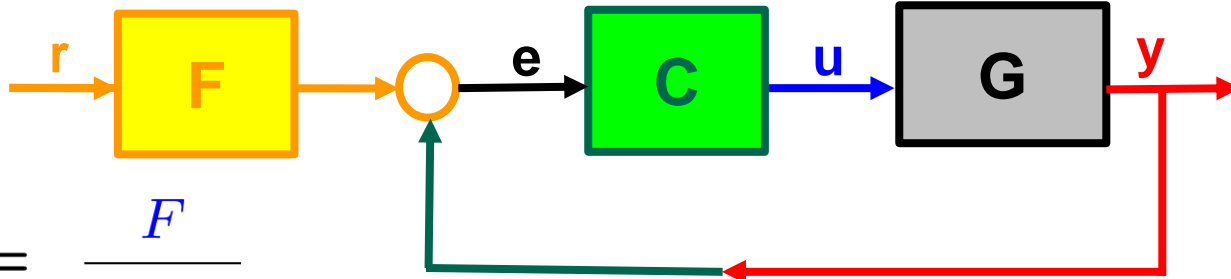


$$C(s) = K \frac{s + 2}{s + 10} \quad G(s) = \frac{1}{s(s + 1)}$$



$$K = \textcircled{30} \textcircled{70} \textcircled{120}$$

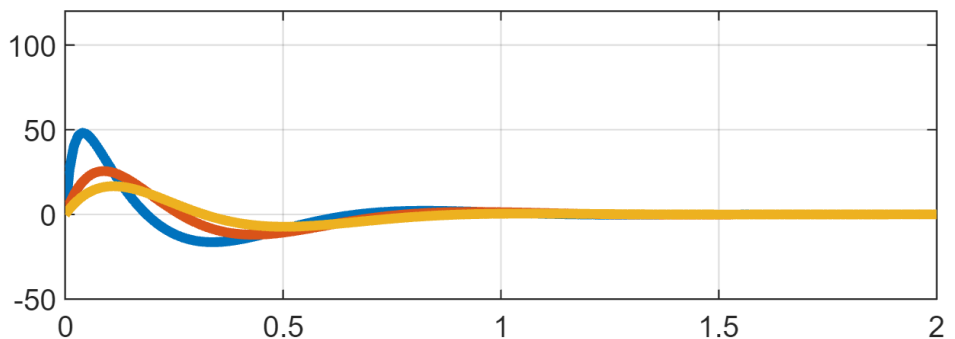
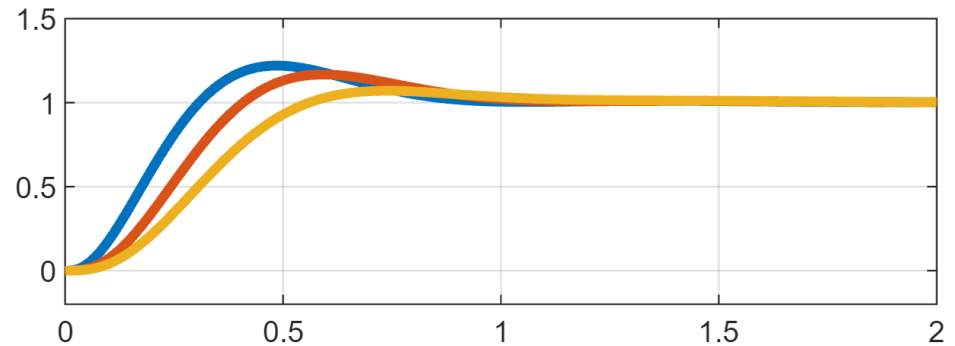
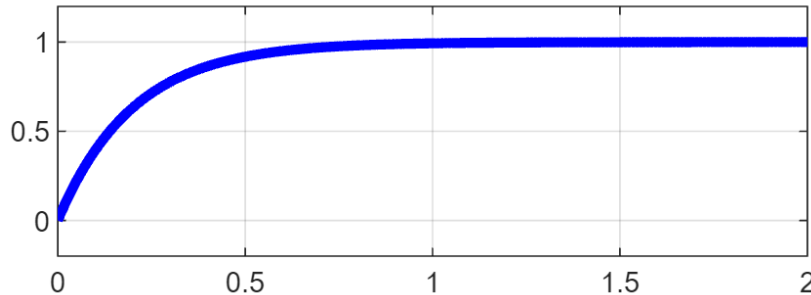
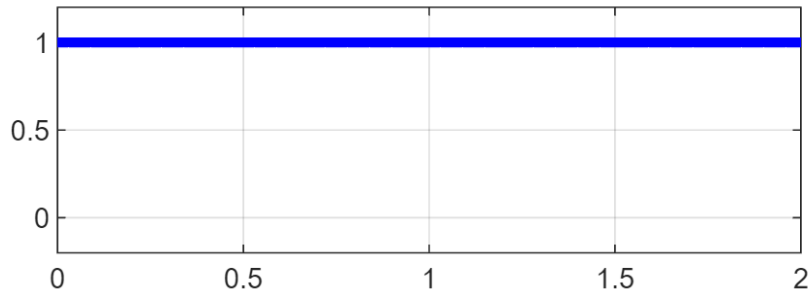




$$F(s) = \frac{F}{s + F}$$

$$C(s) = K \frac{s + 2}{s + 10}$$

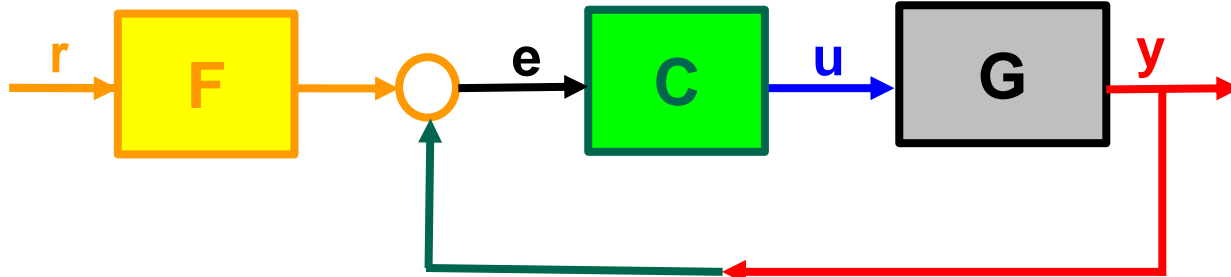
$$G(s) = \frac{1}{s(s + 1)}$$



$$K = 30, 70, 120$$

$$F = 5, 10, 50$$

Feedback and Feedforward Controls



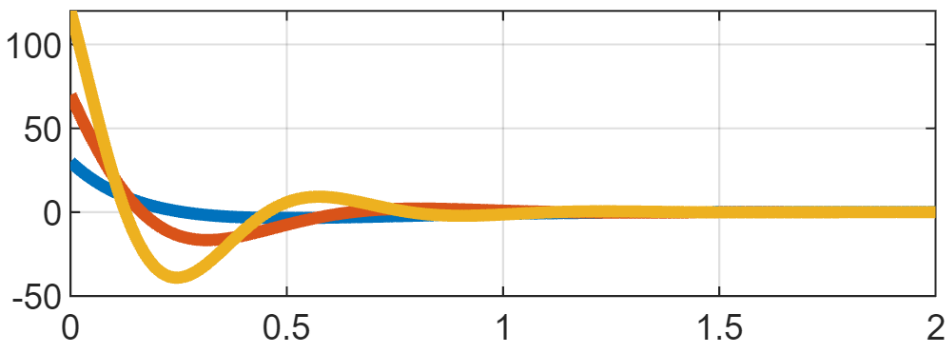
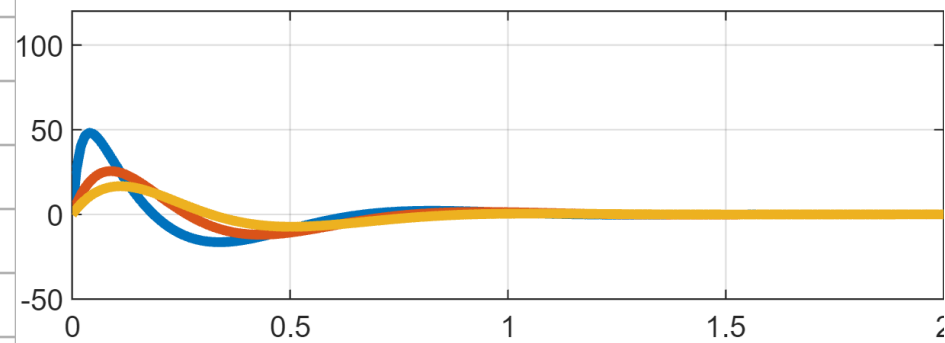
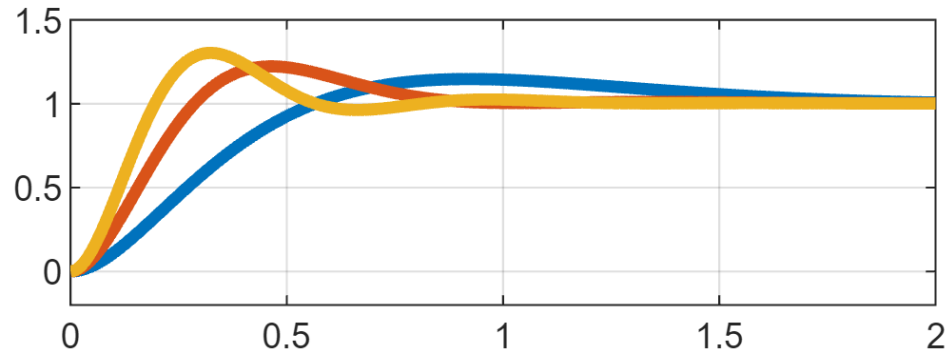
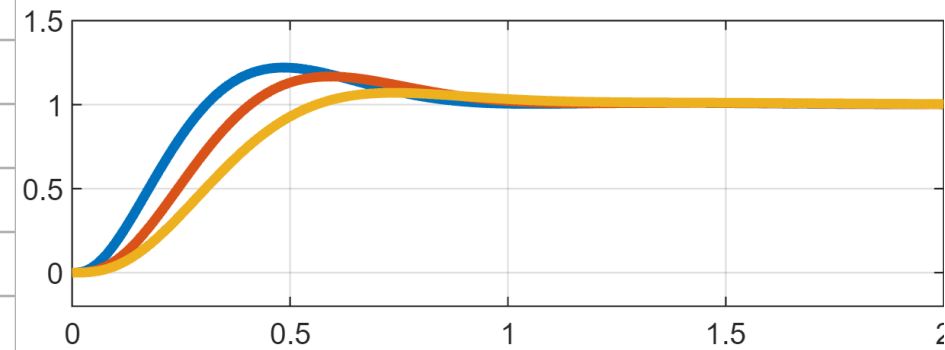
$$F(s) = \frac{F}{s + F}$$

$$C(s) = K \frac{s + 2}{s + 10}$$

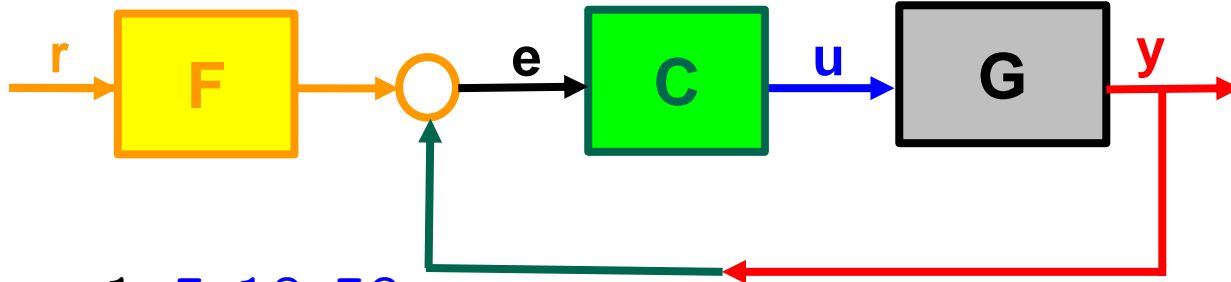
$$G(s) = \frac{1}{s(s + 1)}$$

$$F = 5, 10, 50$$

$$K = 30, 70, 120$$

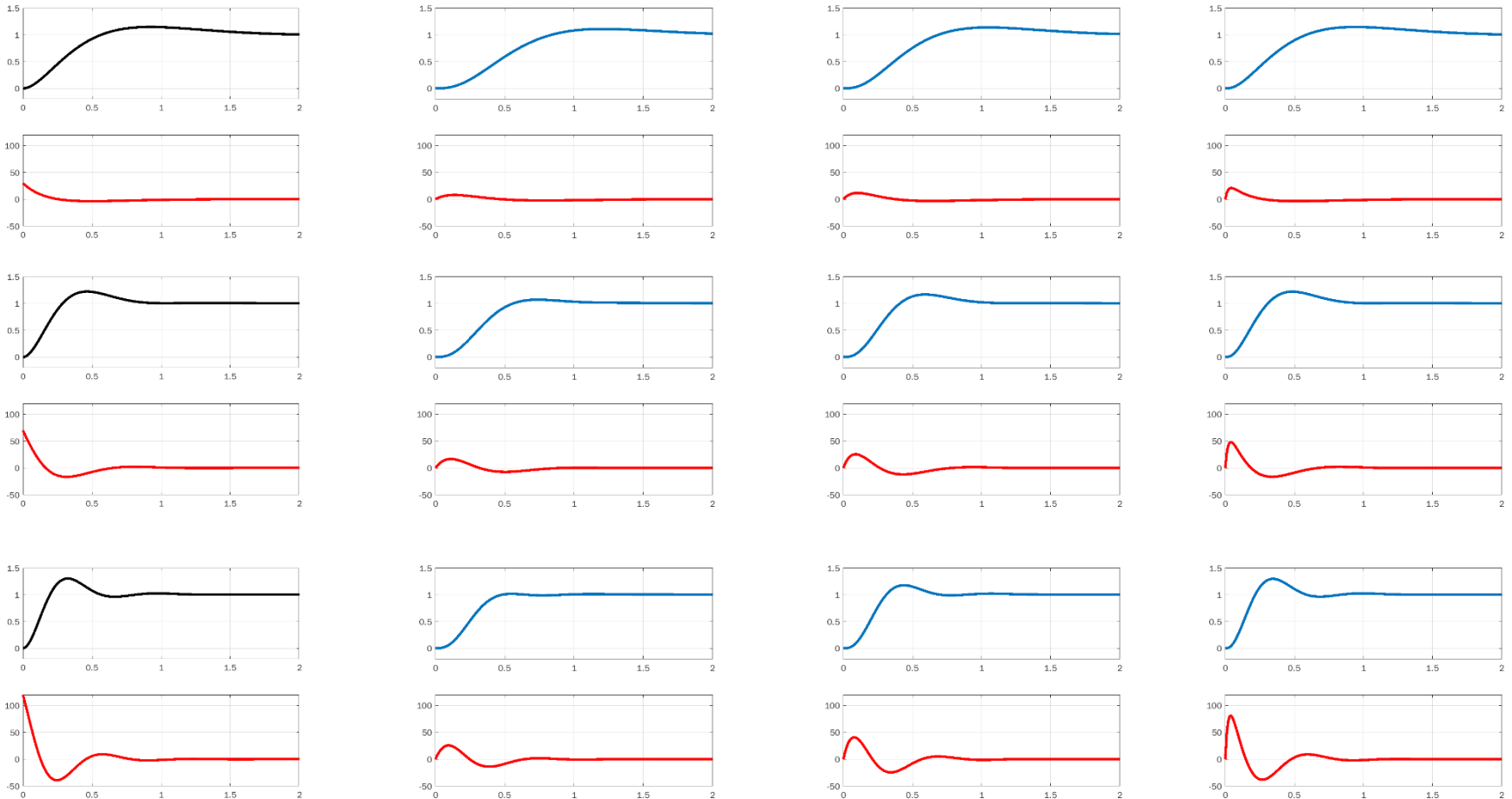


Feedback and Feedforward Controls

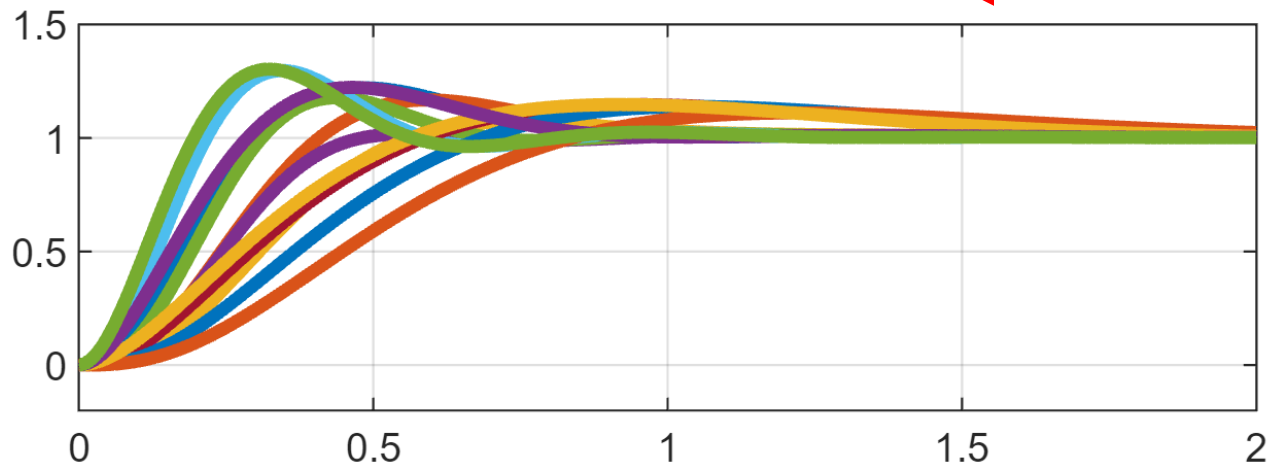
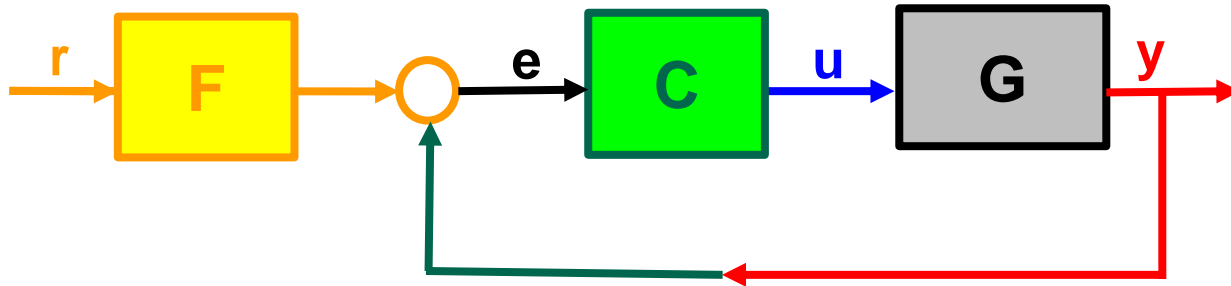


$$F = 1, 5, 10, 50$$

$$K = 30, 70, 120$$

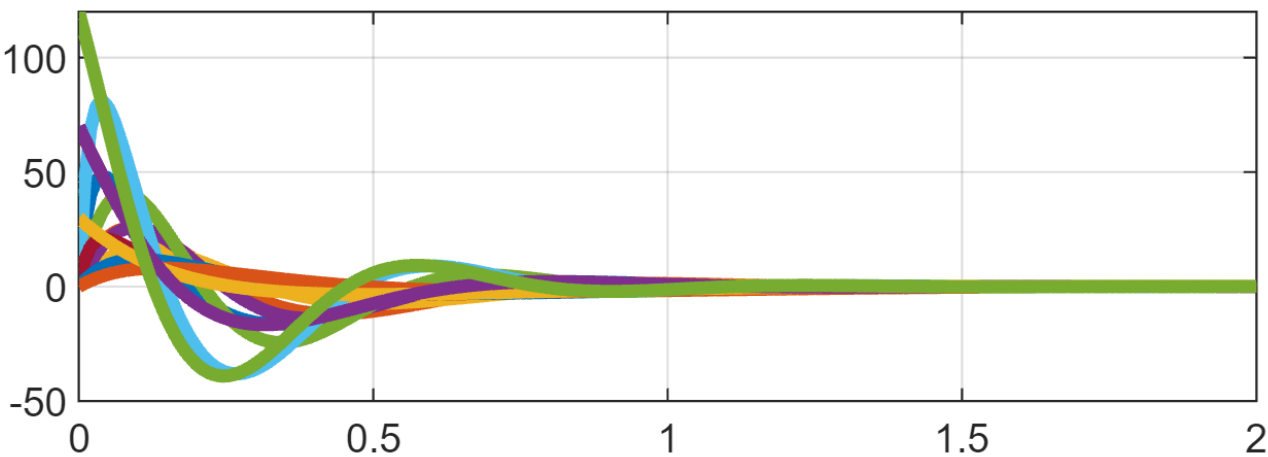


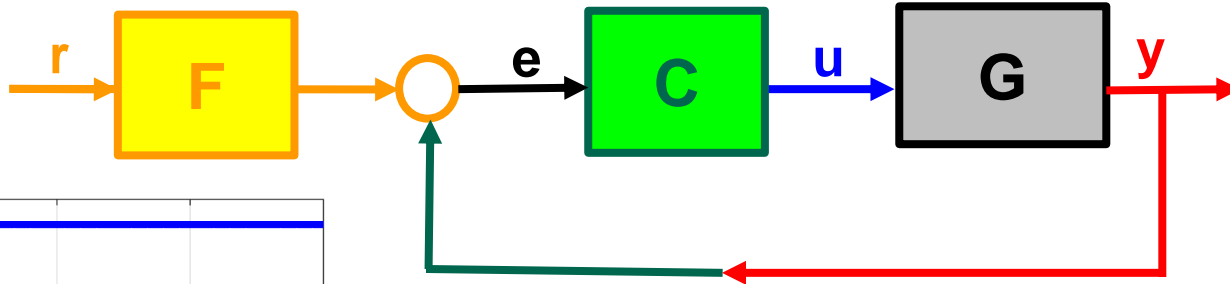
Feedback and Feedforward Controls



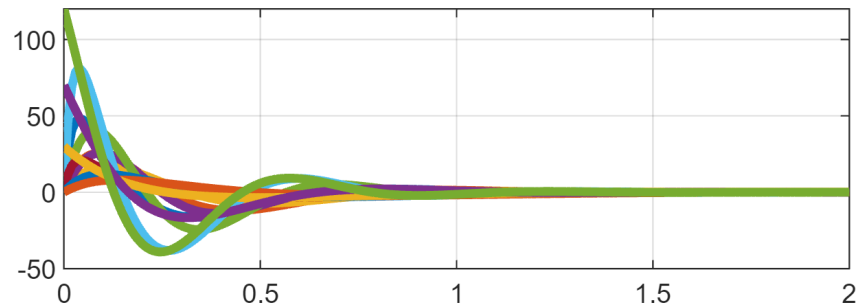
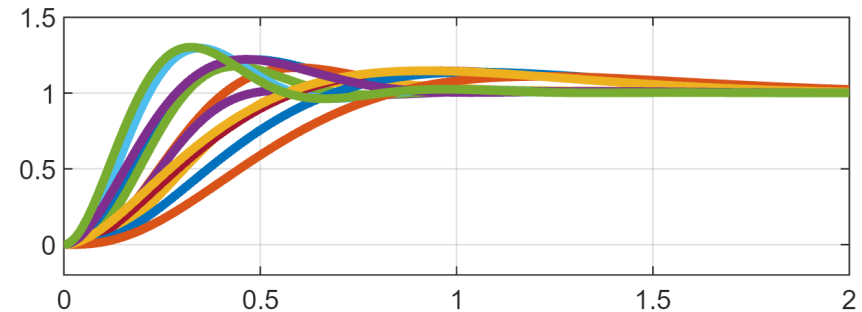
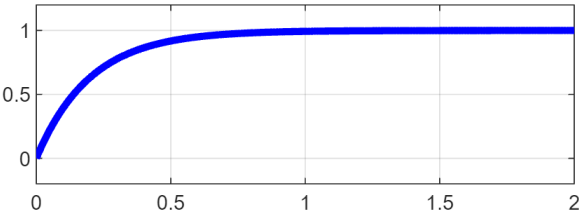
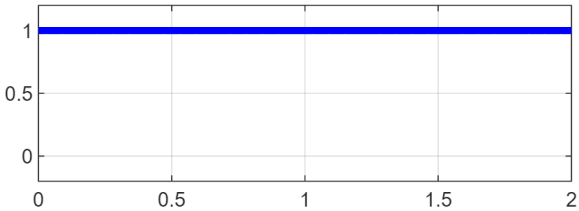
$$K = 30, 70, 120$$

$$F = 1, 5, 10, 50$$





$$F = 1, 5, 10, 50 \quad K = 30, 70, 120$$



■ 反饋控制的功能：A or B

A. 穩定系統，達到縮小誤差

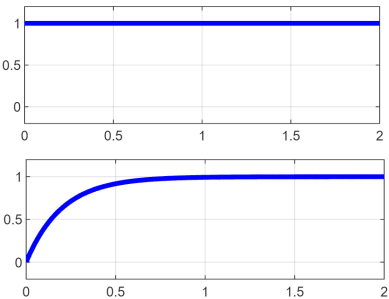
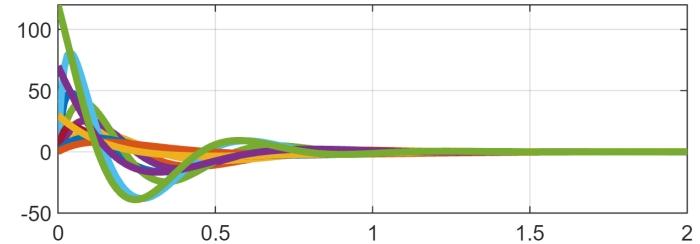
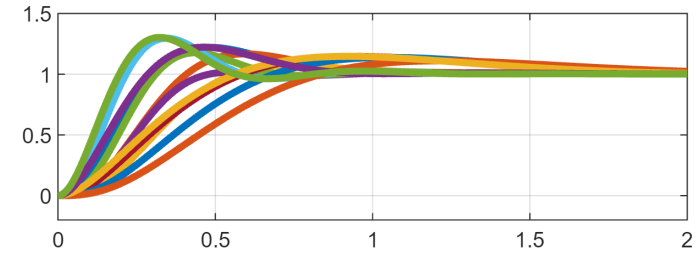
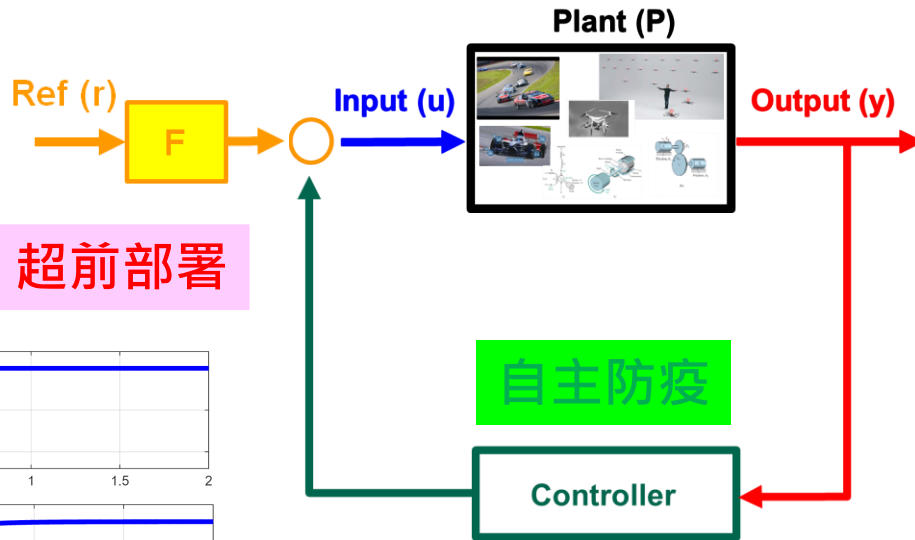
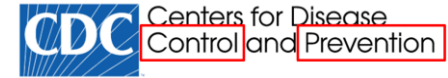
B. 提供合適的追蹤目標

■ 前饋控制的功能：A or B

A. 穩定系統，達到縮小誤差

B. 提供合適的追蹤目標

CoViD - 19 (新型冠狀病毒肺炎)



排隊買口罩



排隊打疫苗



排隊買快篩

