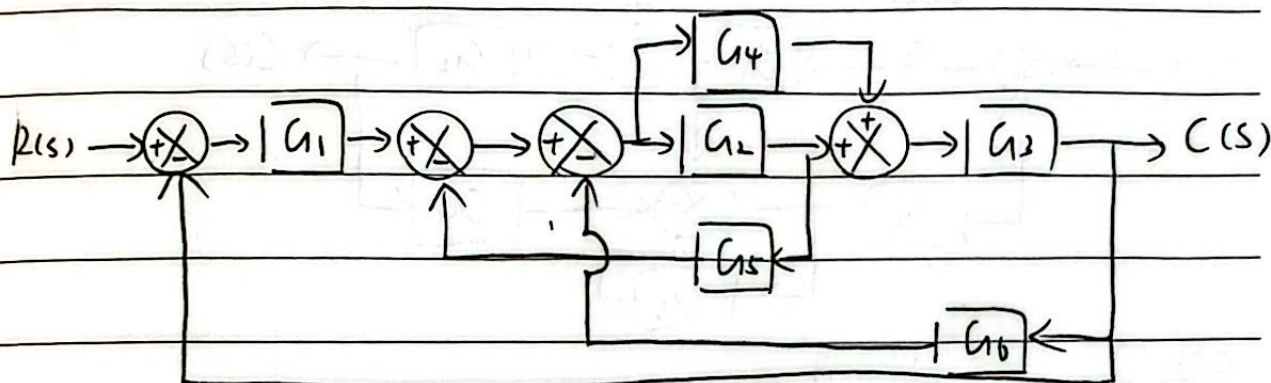


10.8

1.



$$G(s) = \frac{1}{\Delta} \sum P_i \Delta_i$$

$$P_1 = G_1 G_2 G_3, \quad P_2 = G_1 G_4 G_3$$

$$\Delta = 1 - \sum L_{11} + \sum L_{22}, \quad L_{12} = (-G_2 G_5) (-G_4 G_3 G_6) + (-G_2 G_5) (-G_1 G_4 G_3)$$

$$L_{11}: -G_1 G_2 G_3, -G_2 G_3 G_6, -G_2 G_5, -G_4 G_3 G_6, -G_1 G_4 G_3$$

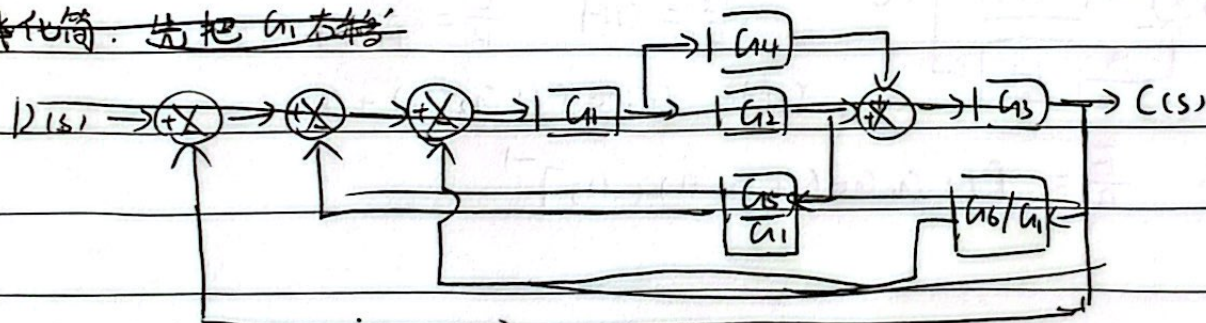
$$\Delta = 1 + G_1 G_2 G_3 + G_2 G_3 G_6 + G_2 G_5 + G_4 G_3 G_6 + G_1 G_4 G_3 + \sum L_{22}$$

$$\Delta_1 = 1, \quad \Delta_2 = 1 + G_2 G_5, \quad L_{12} = 0$$

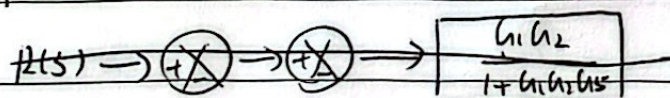
$$\therefore G(s) = \frac{G_1 G_2 G_3 + (G_1 G_4 G_3)(1 + G_2 G_5)}{1 + G_1 G_3 (G_2 + G_4) + (G_2 + G_4) G_3 G_6 + G_2 G_5 (1 + G_4 G_3 G_6 + G_1 G_4 G_3)}$$

$$1 + G_1 G_3 (G_2 + G_4) + (G_2 + G_4) G_3 G_6 + G_2 G_5 (1 + G_4 G_3 G_6 + G_1 G_4 G_3)$$

简化: 先把 G_1 右移



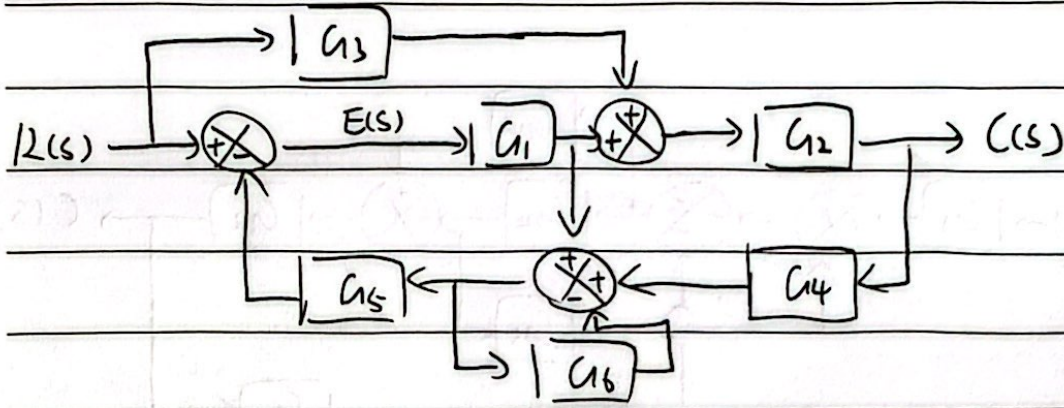
消 $G_1 G_2 G_5$ 负反馈



$$R(s) \rightarrow \frac{G_1 G_2 G_3 + G_1 G_3 (G_2 + G_4) + G_2 G_5 (1 + G_4 G_3 G_6 + G_1 G_4 G_3)}{1 + (G_2 + G_4) (G_1 G_3 + G_3 G_6) + G_2 G_5} \rightarrow C(s)$$



2.



$$\frac{C(s)}{R(s)} = G(s) = \frac{1}{\Delta} \sum P_i \Delta_i$$

$$P_1 = G_3 G_2 \quad P_2 = G_1 G_2$$

$$L_1 = -G_1 G_5 \quad L_2 = -G_6 \quad L_3 = -G_1 G_2 G_4 G_5$$

$$L_{11} = -G_1 G_5 - G_6 - G_1 G_2 G_4 G_5 \quad L_{12} = 0$$

$$\Delta = 1 + G_1 G_5 + G_6 + G_1 G_2 G_4 G_5$$

$$\Delta_1 = 1 + G_1 G_5 + G_6 \quad \Delta_2 = 1 + G_6$$

$$\therefore G(s) = \frac{(G_3 G_2)(1 + G_1 G_5 + G_6) + G_1 G_2(1 + G_6)}{1 + G_1 G_5 + G_6 + G_1 G_2 G_4 G_5} = \frac{C(s)}{R(s)}$$

对 $R \rightarrow \oplus \xrightarrow{E} \boxed{G} \rightarrow C$ $\frac{B}{E} = GH$, $\frac{C}{R} = \frac{G}{1+GH}$

$\therefore GH = G_1 G_5 (1 + G_2 G_4) + G_6$

$$\therefore \frac{E}{R} = [1 + G_1 G_5 (G_2 G_4 + 1) + G_6]^{-1}$$

