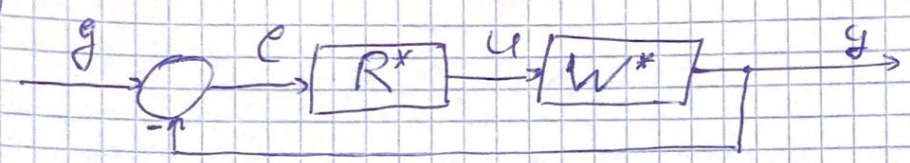
г)



$k = 2$ – порядок астатизма.

$T = 0,1$

$$W^*(z) = \frac{z + 4,36}{(z-1,0)(z-0,53)}$$

Синтез регулятора:

$P_B^* = 1$; $P_H^* = z + 4,36$

$Q_B^* = (z-0,53)$ $Q_H^* = (z-1,0)$

$n_{P_B} = 0$ $n_{P_H} = 1$

$n_{Q_B} = 1$ $n_{Q_H} = 1$

$n_Q = 2$ $q = 1$ – степень корня ур-ия $z = 1$

$r = k - q = 1$

$$n_G \geq n_{Q_H} + r + n_Q - 1 - n_{P_B}$$

$$n_G \geq 1 + 1 + 2 - 1 - 0$$

$$n_G \geq 3$$

2)

$$\begin{cases} n_{Q_B} + n_M \le n_{P_B} + n_N + r \\ n_M + n_N + 1 \ge n_G \\ n_G = n_{Q_H} + n_N + r \end{cases}$$

$$\begin{cases} 1 + n_M \le 0 + n_N + 1 \\ n_M + n_N + 1 \ge 3 \\ 3 = 1 + n_N + 1 \end{cases}$$

$n_N = 1$

$\left.\begin{array}{l} n_M \le 1 \\ n_M \ge 1 \end{array}\right\} \Rightarrow n_M = 1$

$M^* = b_1 z + b_0 \; ; \; N^* = a_1 z + a_0$

$G^* = P_H^* \cdot M^* + Q_H^* \cdot N^* \cdot (z-1)^r =$

$= (z + 4{,}36) \cdot (b_1 z + b_0) + (z - 1{,}0) \cdot (a_1 z + a_0) \cdot$

$\cdot (z-1) = z^3 = z^2 b_1 + b_0 z + 4{,}36 b_1 z + 4{,}36 b_0 +$

$+ a_1 z^3 + a_0 z^2 - 2a_1 z^2 - 2a_0 z + a_1 z + a_0$

z^3: $a_1 = 1$

z^2: $b_1 + a_0 - 2a_1 = 0$

z^1: $b_0 + 4{,}36 b_1 - 2a_0 + a_1 = 0$

z^0: $4{,}36 b_0 + a_0 = 0$

$z = 1$: $5{,}36 \cdot (b_1 + b_0) = 1$

$b_1 + b_0 = \frac{1}{5{,}36} \Rightarrow b_0 = \frac{1}{5{,}36} - b_1$

3)

$$4{,}36\,b_0 = -a_0 \Rightarrow a_0 = -4{,}36\,b_0$$

$$b_1 + (-4{,}36\,b_0) - 2a_1 = 0$$

$$b_1 - 4{,}36\,b_0 - 2 = 0$$

$$b_1 = 4{,}36\,b_0 + 2$$

$$b_1 = \frac{4{,}36}{5{,}36} - 4{,}36\,b_1 + 2$$

$$5{,}36\,b_1 = \frac{4{,}36}{5{,}36} + 2$$

$$b_1 = \frac{\frac{4{,}36}{5{,}36} + 2}{5{,}36} = \frac{9425}{17956} \Rightarrow b_0 = \frac{1}{5{,}36} - \frac{9425}{17956} =$$

$$= -\frac{6075}{17956}$$

$$a_0 = -4{,}36 \cdot \left(-\frac{6075}{17956}\right) = \frac{26487}{17956}$$

$$M^* = \frac{9425}{17956}Z - \frac{6075}{17956}$$

$$N^* = Z + \frac{26487}{17956}$$

$$W_p^* = \frac{Q_B^* \cdot M^*}{P_B^* N^* (Z-1)^r} =$$

$$= \frac{(Z-0{,}53)\cdot\left(\frac{9425}{17956}Z - \frac{6075}{17956}\right)}{\left(Z + \frac{26487}{17956}\right)\cdot(Z-1)}$$