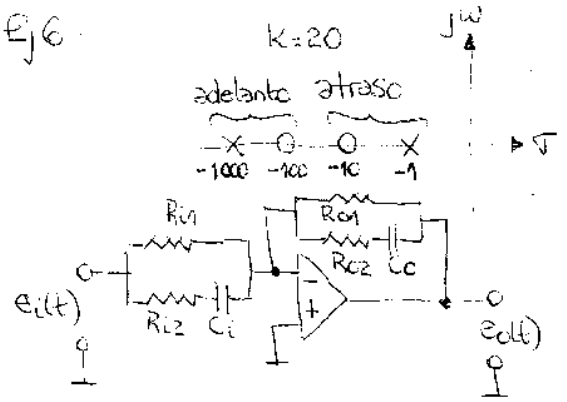
TP9-3 · Diseño de compensadores electrónicos

Ej 6

$K = 20$

$1K\Omega < R < 1M\Omega$



$$\frac{E_o(s)}{E_i(s)} = -\frac{Z_o(s)}{Z_i(s)}$$

$$Z_o(s) = \frac{1}{\frac{1}{R_{o1}} + \frac{1}{R_{o2} + \frac{1}{sC_o}}} = \frac{1}{\frac{1}{R_{o1}} + \frac{sC_o}{R_{o2}C_o s + 1}} = \frac{R_{o1}(R_{o2}C_o s + 1)}{R_{o2}C_o s + 1 + R_{o1}C_o s}$$

$$Z_o(s) = \frac{R_{o1}R_{o2}C_o\left(s + \frac{1}{R_{o2}C_o}\right)}{(R_{o1}+R_{o2})C_o\left(s + \frac{1}{(R_{o1}+R_{o2})C_o}\right)} = R_{o1}\|R_{o2}\,\frac{s + \frac{1}{R_{o2}C_o}}{s + \frac{1}{(R_{o1}+R_{o2})C_o}}$$

$$\frac{E_o(s)}{E_i(s)} = -\frac{R_{o1}\|R_{o2}}{R_{i1}\|R_{i2}} \cdot \frac{\left(s + \frac{1}{R_{o2}C_o}\right)\left[s + \frac{1}{(R_{i1}+R_{i2})C_i}\right]}{\left[s + \frac{1}{(R_{o1}+R_{o2})C_o}\right]\left(s + \frac{1}{R_{i2}C_i}\right)} + \text{adelanto.}$$

(atraso)

$$\frac{R_{o1}\|R_{o2}}{R_{i1}\|R_{i2}} = 20 \;;\; R_{o2}C_o = 0{,}1 \;;\; (R_{o1}+R_{o2})C_o = 1$$

$$(R_{i1}+R_{i2})C_i = 0{,}01 \;;\; R_{i2}C_i = 0{,}001$$

$R_{o2} = 100\,k\Omega$ (se elige este valor).

$$C_o = \frac{0,1}{10^5} = 1\,\mu F = C_o$$

$$(R_{o1} + 10^5)\,10^{-6} = 1 \;;\quad 10^{-6} R_{o1} + 0,1 = 1 \;;\quad 10^{-6} R_{o1} = 0,9$$

$$R_{o1} = 900\,k\Omega$$

$$R_{o1} \parallel R_{o2} = \frac{100.900}{1000} = 90\,k\Omega$$

$$R_{i1} \parallel R_{i2} = \frac{R_{o1} \parallel R_{o2}}{20} = 4,5\,k\Omega = \frac{R_{i1} \cdot R_{i2}}{R_{i1} + R_{i2}}$$

$$\frac{R_{i2}}{R_{i1} + R_{i2}} = 0,1 \;;\quad 4,5\,k\Omega = R_{i1}\,0,1 \;;\quad R_{i1} = 45\,k\Omega$$

$$R_{i2} = 0,1 R_{i1} + 0,1 R_{i2} \;;\quad R_{i2} = 4,5\,k\Omega + 0,1 R_{i2}$$

$$R_{i2} = \frac{4,5\,k\Omega}{0,9} = \frac{45\,k\Omega}{9} = 5\,k\Omega = R_{i2}$$