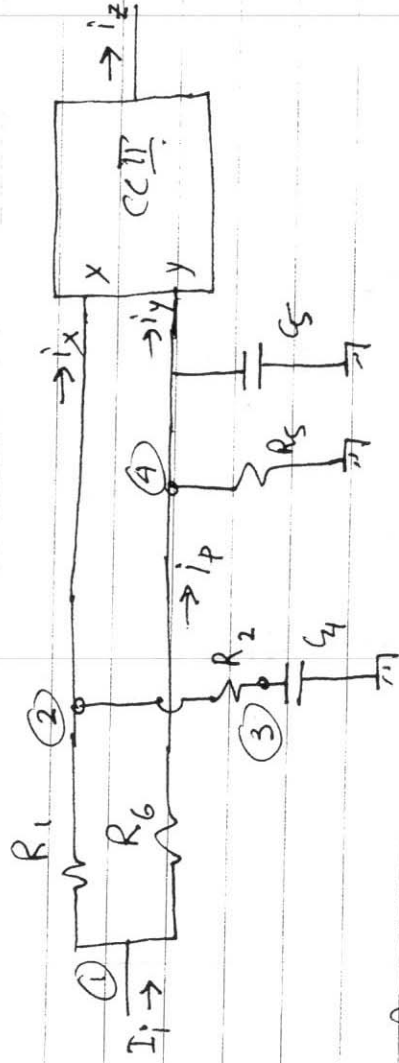


Lab on CC-based expt. ELEC 2141/681 W4011-2012



Basic rules $i_y = 0$; $v_x = v_y$ i.e. $v_2 = v_4$ OR
 $v_2 = v_4$

$$|i_z| = i_x$$

So find i_x in terms of I_i to obtain $\frac{i_z}{I_i}$!

KCL @ node ② will give

$$i_x = G_1(v_1 - v_2) + (v_3 - v_2)G_2 \dots \textcircled{1}$$

$$\text{Further: } i_p = (v_1 - v_4)G_6 = (v_1 - v_2)G_6 \dots \textcircled{2}$$

$$\text{But } v_4 = v_2 = \frac{i_p}{G_5 + sC_5} \dots \textcircled{3}$$

$$\text{So } (G_5 + sC_5) v_2 = (v_1 - v_2) G_6$$

Solve v_1 in terms of v_2 i.e.

$$v_2 = \frac{G_6 v_1}{G_5 + sC_5 + sC_5} \text{ or } v_1 = \dots \textcircled{4}$$

$$\text{Note that } v_3 = (v_2 - v_3) \cdot \frac{G_2}{sC_4}$$

$$\text{Solve for } v_3 \text{ i.e. } v_3 = v_2 \frac{G_2}{G_2 + sC_4} \dots \textcircled{5}$$

At the input

$$F_i' = (g_1 + g_6)(V_1 - V_2) \dots (6)$$

In (6) write F_i' in terms of V_1 only
(use eqn. 4)

In (1) write i_x in terms of V_1 only
(use eqn. 4, 5)

Get the ratio i_x / F_i'

$$= \frac{s^2 g_1 g_4 g_5 + s(g_1 g_5 g_4 + g_1 g_2 g_5 - g_2 g_6 g_4) + g_1 g_5 g_6}{(g_1 g_4 g_5 + g_6 g_4 g_5)^2 + (g_1 g_5 g_4 + g_5 g_6 g_4 + g_1 g_2 g_5 + g_2 g_6 g_5) s + g_1 g_5 g_2 + g_2 g_5 g_6}$$

$$= \frac{s^2 g_1 g_4 g_5 + (g_1 g_5 g_4 + g_1 g_2 g_5 - g_2 g_6 g_4) s + g_1 g_5 g_6}{(g_1 + g_6) [s^2 g_4 g_5 + s(g_2 g_5 + g_5 g_4) + g_2 g_5]}$$

as given in the lab manual!