



NOMBRE DEL ALUMNO:  
Diego Moisés González Solís

CARRERA:  
Ing. Mecatrónica

MATERIA:  
INGENIERIA DE CONTROL

GRADO Y GRUPO:  
8°-B

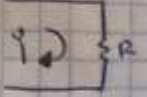
CUATRIMESTRE:  
ENERO-ABRIL

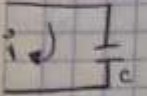


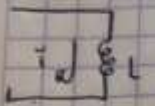
INGENIERIA DE CONTROL

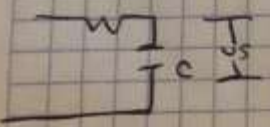
Modelado de sistemas electrónicos, Diego H. Gonzalez

LAPLACE


 $V = IR$ 
 $V = RI$


 $V = \frac{1}{C} \int i dt$ 
 $V = \frac{1}{Cs} I$


 $V = L \frac{di}{dt}$ 
 $V = LsI$



① Ecuación

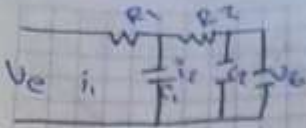
$$V_c = IR + \frac{1}{C} \int i dt \rightarrow V_c = IR + \frac{1}{Cs} I$$

$$V_s = \frac{1}{C} \int i dt \rightarrow V_s = \frac{1}{Cs} I$$

②  $G(s) \leftarrow$  Función de Transferencia (salida/entrada)

$$\frac{V_s}{V_c} = \frac{\frac{1}{Cs} I}{IR + \frac{1}{Cs} I} = \frac{\frac{1}{Cs}}{R + \frac{1}{Cs}} = \frac{\frac{1}{Cs}}{\frac{CsR + 1}{Cs}} = \frac{1}{CsR + 1} = G(s)$$

INGENIERIA DE CONTROL



$0 = V_{C1} + V_{C2} - V_o$   
 $V_e = V_{R1} + V_{C1}$   
 $0 = V_{C1} + V_{R2} + V_{C2}$   
 $0 = \frac{1}{C_1} \int (i_1 - i_2) dt + i_2 R_2 + \frac{1}{C_2} \int i_2 dt$   
 $0 = \frac{1}{C_1} \int i_2 dt$   
 $V_{C1} = i_1 R_1$   
 $V_{C1} = \frac{1}{C_1} \int (i_1 - i_2) dt$   
 $V_{C2} = \frac{1}{C_2} \int i_2 dt$   
 $V_{C2} = \frac{1}{C_2} \int i_2 dt$

①  $V_e = R_1 i_1 + \frac{1}{C_1} \int (i_1 - i_2) dt$   
 ②  $0 = \frac{1}{C_1} \int (i_1 - i_2) dt + R_2 i_2 + \frac{1}{C_2} \int i_2 dt$   
 ③  $V_{C2} = \frac{1}{C_2} \int i_2 dt$   
 ④  $I_2 = V_{C2} C_2 s$

$0 = -\frac{1}{C_1} I_1 + I_2 \left( \frac{1}{C_1 s} + R_2 + \frac{1}{C_2 s} \right)$   
 $\frac{1}{C_1 s} I_1 = I_2 \left( \frac{1}{C_1 s} + R_2 + \frac{1}{C_2 s} \right)$   
 ⑤  $I_1 = I_2 \left( 1 + R_2 C_1 s + \frac{C_1}{C_2} \right)$   
 ⑥  $I_1 = V_{C2} C_2 s \left( 1 + R_2 C_1 s + \frac{C_1}{C_2} \right)$   
 $V_e = R_1 \left( V_{C2} C_2 s \left( 1 + R_2 C_1 s + \frac{C_1}{C_2} \right) \right) + \frac{1}{C_1 s} \left( V_{C2} C_2 s \left( 1 + R_2 C_1 s + \frac{C_1}{C_2} \right) - V_{C2} \right)$   
 $V_e = V_{C2} \left[ R_1 C_2 s \left( 1 + R_2 C_1 s + \frac{C_1}{C_2} \right) + \left( 1 + R_2 C_1 s + \frac{C_1}{C_2} \right) - \frac{C_2 s}{C_1} \right]$

Scribe

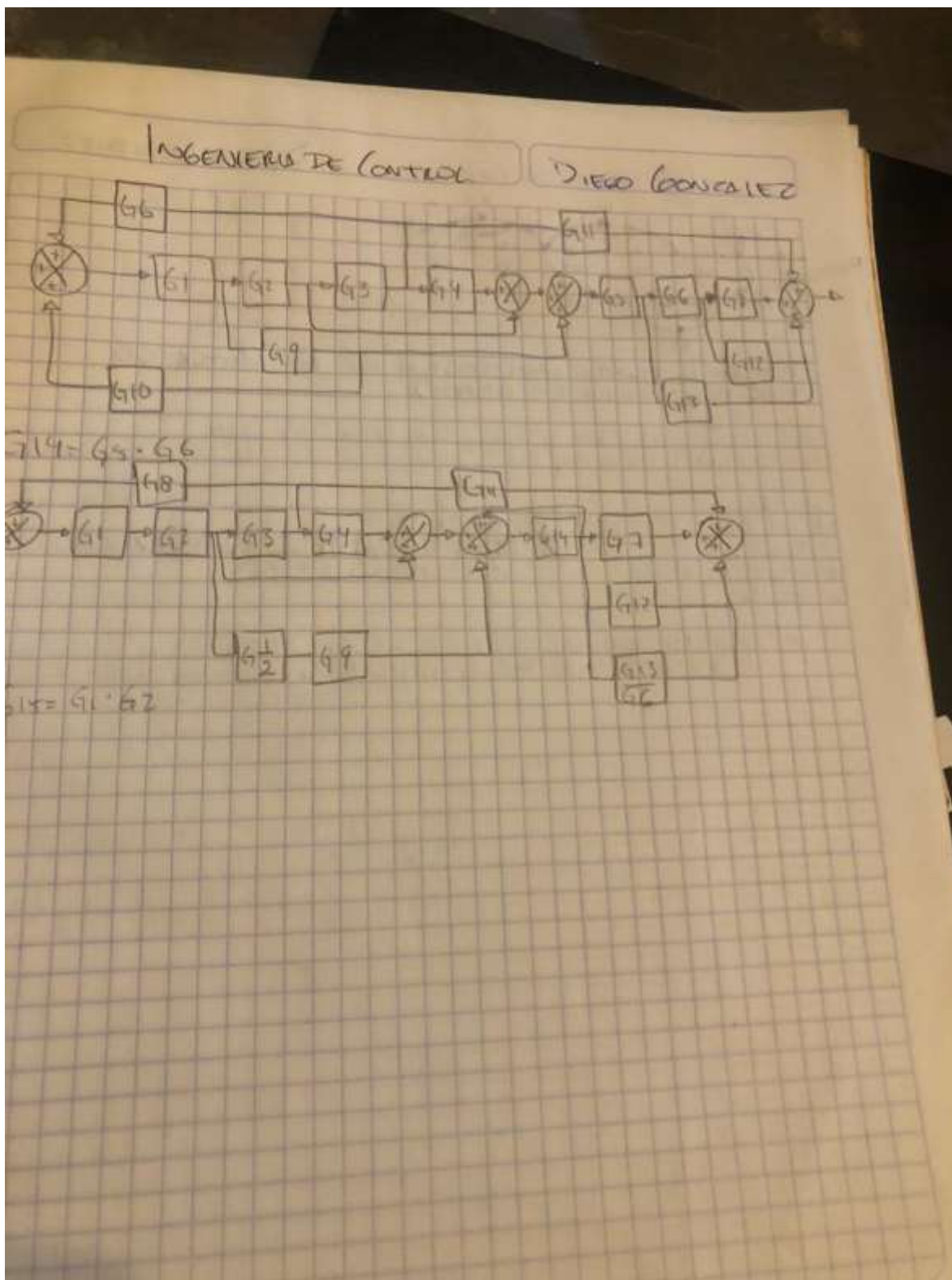
$$\frac{U_s}{U_e} = \frac{(R_1 C_2 S^2 (C_1 + R_2 C_2 S) + R_1 C_2 S)}{C_1 C_2 S^2 (C_1 + C_1 C_2 R_2 S + C_1)} + \frac{C_2}{C_1}$$

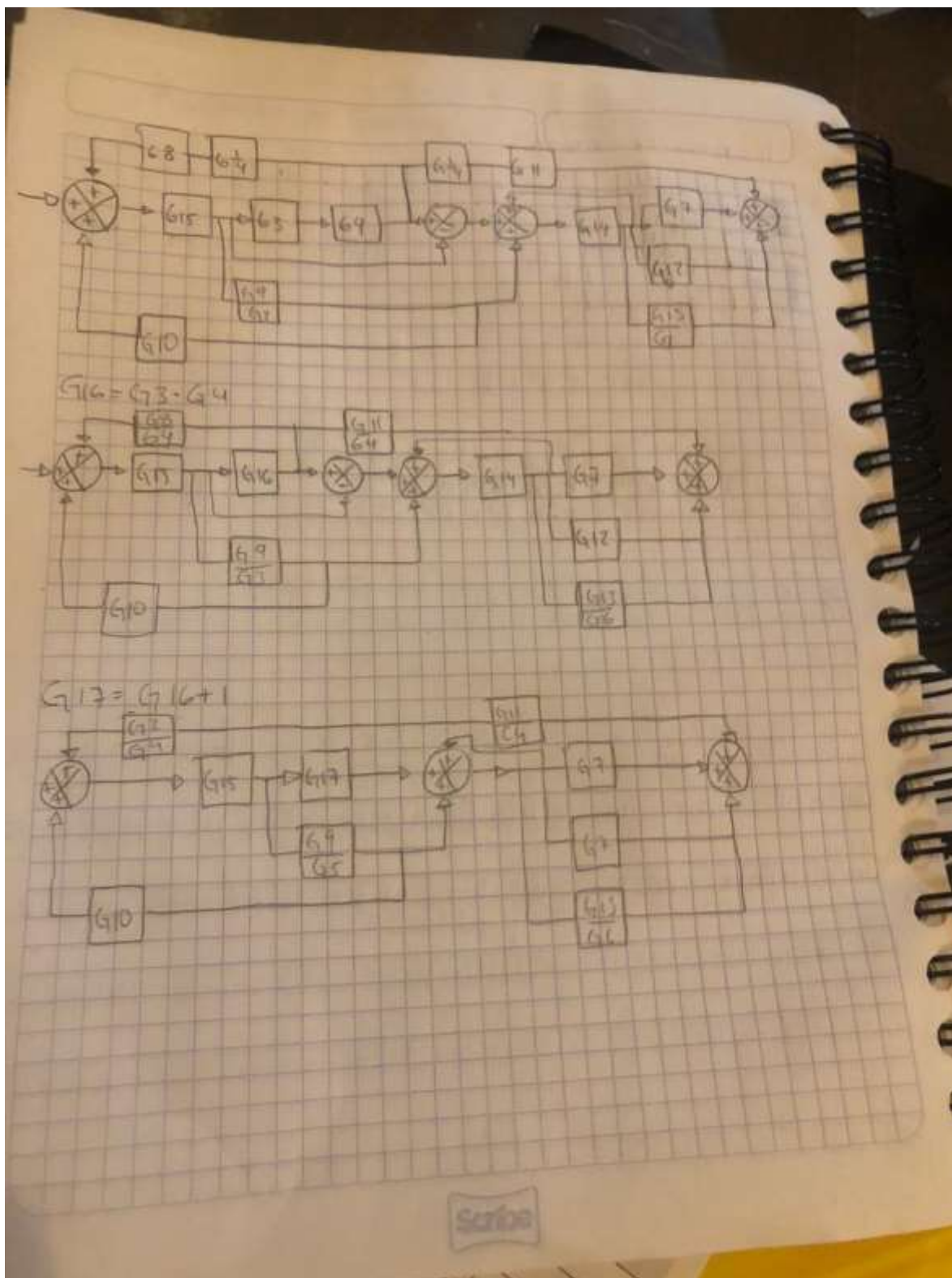
$$\frac{U_s}{U_e} = \frac{(R_1 C_2 S^2 (C_1 + C_1 C_2 R_2 S + C_1) + (C_2 S (C_1 + R_1 C_2 R_2 S + C_1))}{C_1 C_2 S^2} - \frac{C_2}{C_1}$$

$$\frac{U_s}{U_e} = \frac{R_1 C_2 S^2 + R_1 R_2 C_1^2 C_2 S^2 + R_1 C_1^2 C_2 S^2 + C_1^2 S + C_1 C_2^2 R_2 S^2 + C_1 C_2^2 - C_2 S}{C_1 C_2 S}$$

$$\frac{U_s}{U_e} = -S^2 (R_1 R_2 C_1^2 C_2^2 + S^2 (R_1 R_1 C_2^2 + R_1 C_1^2 C_2 + C_1 (R_2 C_2) + C_1 C_2^2)$$

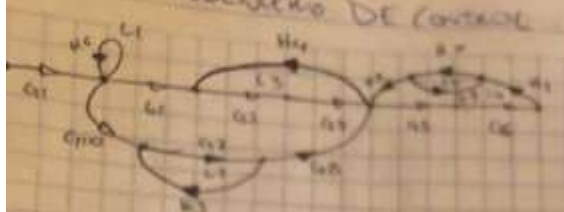






INGENIERIA DE CONTROL

DIEGO GONZALEZ



Obtener la función característica de un motor CD (todo el desarrollo en un plano)

$\Delta_1 = G_1, G_2, G_3, G_4, G_5, G_6, G_7, G_8, G_9, G_{10}$   
 $\Delta_2 = G_1, G_{10}, G_2, G_3, G_4, G_5$   
 $\Delta_3 = H_1$   
 $\Delta_4 = G_2, H_1$   
 $\Delta_5 = G_2, G_3, H_1$   
 $\Delta_6 = G_2, G_3, H_1, H_2, H_3$   
 $\Delta_7 = G_2, H_1$

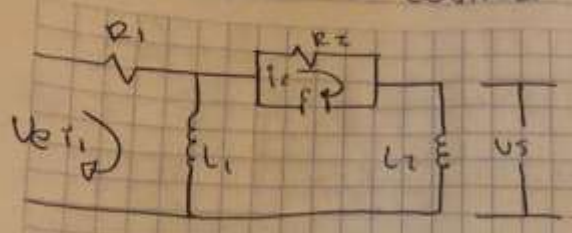
$\Delta_1 = 1 - 0$   
 $\Delta = 1 - (H_1 + L_1 + L_2 + L_3 + L_4 + L_5 + L_6 + L_7 + L_8 + L_9 + L_{10})$   
 $\Delta = 1 - H_1 - L_1 - L_2 - L_3 - L_4 - L_5 - L_6 - L_7 - L_8 - L_9 - L_{10}$

$G(s) = \frac{G_1 G_2 G_3 G_4 G_5 G_6 G_7 G_8 G_9 G_{10}}{1 - H_1 - G_2 H_1 - G_2 G_3 H_1 - G_2 G_3 H_1 H_2 - G_2 G_3 H_1 H_2 H_3 - G_2 G_3 H_1 L_1 - G_2 G_3 H_1 L_2 - G_2 G_3 H_1 L_3 - G_2 G_3 H_1 L_4 - G_2 G_3 H_1 L_5 - G_2 G_3 H_1 L_6 - G_2 G_3 H_1 L_7 - G_2 G_3 H_1 L_8 - G_2 G_3 H_1 L_9 - G_2 G_3 H_1 L_{10}}$



INGENIERIA DE CONTROL

Diego Gonzalez Salas



$$0 = V_{R1} + V_{L1} - V_C$$

$$V_e = V_{R1} + V_{L1}$$

$$0 = V_{L1} + V_{R2} + V_C$$

$$0 = V_{L1} + V_C + V_{L2}$$

$$V_e = i_1 + R_1 L_1 \frac{di_1(t)}{dt}$$

$$0 = L_1 \frac{di_1(t)}{dt} + i_2 + R_2 + \frac{1}{C_2} \int (i_2 - i_3 - i_1) dt$$

$$0 = L_1 \frac{di_1(t)}{dt} + \frac{1}{C_2} \int (i_3 - i_1 + i_2) dt + L_2 \frac{di_3(t)}{dt}$$

$$0 = L_1 \frac{di_1(t)}{dt} + R_2 i_2 + \frac{1}{C_2} (i_2 - i_3 - i_1)$$

$$0 = L_1 \frac{di_1(t)}{dt} + R_2 i_2 + \frac{1}{C_2} i_2 - i_3 - i_1$$

$$i_1 = L_1 \frac{di_1(t)}{dt} + R_2 i_2 + \frac{1}{C_2} i_2 - i_3$$

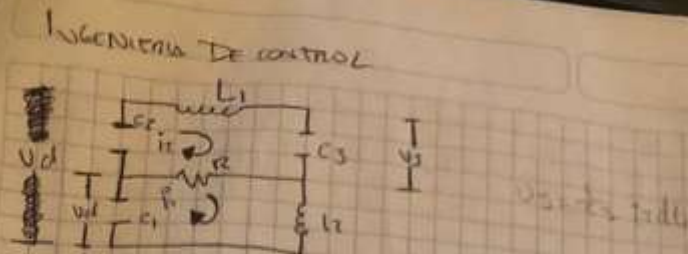
$$0 = L_1 \frac{di_1(t)}{dt} + \frac{1}{C_2} (i_3 - i_1 + i_2) + L_2 \frac{di_3(t)}{dt}$$

$$0 = L_1 \frac{di_1(t)}{dt} + \frac{1}{C_2} i_3 - i_1 + i_2 + L_2 \frac{di_3(t)}{dt}$$

$$-\frac{1}{C_2} i_3 = L_1 \frac{di_1(t)}{dt} - i_1 + i_2 + L_2 \frac{di_3(t)}{dt}$$

$$i_3 = L_1 \frac{di_1(t)}{dt} - \frac{1}{C_2} i_1 + i_2 + L_2 \frac{di_3(t)}{dt}$$



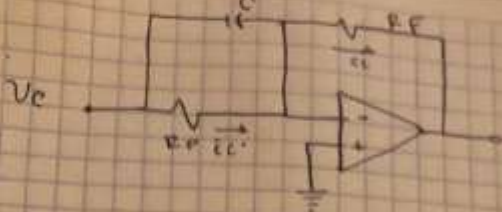


$$\begin{aligned} Q &= U_1 + U_2 + U_3 - U_0 \\ U_1 &= U_{C1} + U_{L1} + U_{L2} \\ U_2 &= \frac{1}{2} \int i_1^2 dt + R(i_1 - i_2) - L \frac{di_1}{dt} \\ Q &= U_1 + U_2 + U_3 + U_4 \\ Q &= \frac{1}{2} \int i_1^2 dt + L \frac{di_1}{dt} + \frac{1}{2} \int i_2^2 dt + R(i_1 - i_2) \\ U_1 &= \frac{1}{2} \int i_1^2 dt + R(i_1 - i_2) + L_2 \frac{di_1}{dt} \\ Q &= \frac{1}{2} \int i_1^2 dt + L_1 \frac{di_1}{dt} + \frac{1}{2} \int i_2^2 dt + R(i_1 - i_2) \\ U_2 &= \frac{1}{2} \int i_2^2 dt \\ U_3 &= U_{L3} \end{aligned}$$

[illegible]

INGENIERIA DE CONTROL

DIEGO GONZALEZ



$i_c = i_f$   
 $V_c R_c - V_o R_c + C \frac{dV_o}{dt} - C \frac{dV_c}{dt} = i_c$   
 $i_f = V_o R_f - V_c R_f$   
 $V_c R_c + C \frac{dV_c}{dt} = i_c$   
 $i_c = -V_o R_f$   
 $V_c R_c + C \frac{dV_c}{dt} = -V_o R_f$   
 $V_c (R_c + C s) = -V_o R_f$   
 $-\frac{(R_c + C s)}{R_f} = \frac{V_o}{V_c}$   
 $K_p (1 + T_z s) \quad K_p \frac{1}{T_c s}$   
 $\frac{V_o}{V_c} = -\frac{R_c}{R_f} \left( 1 + \frac{s}{R_c} \right)$

Scribe