Electrónica de Potencia y Control de Máquinas

(Electrónica de Potencia y Accionamientos)

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Modelado dinámico de la máquina dc de imanes permanentes

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Ecuación del devanado de armadura

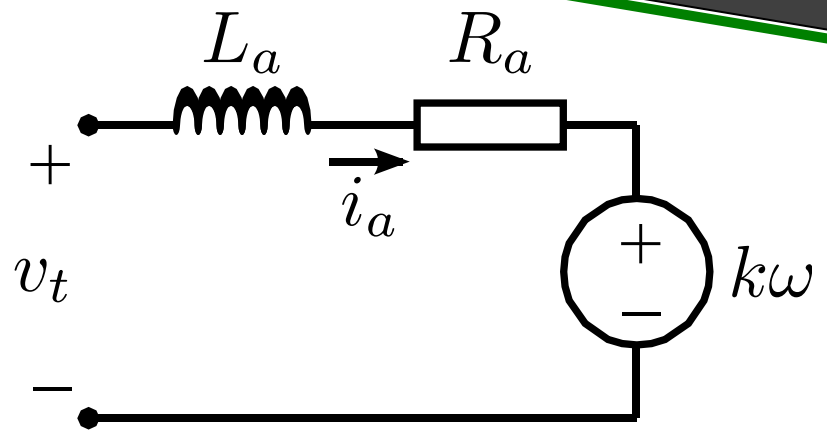
$$v_t = R_a i_a + L_a \frac{di_a}{dt} + k\omega$$

Ecuación del torque

$$T_e = k i_a$$

Ecuación de velocidad

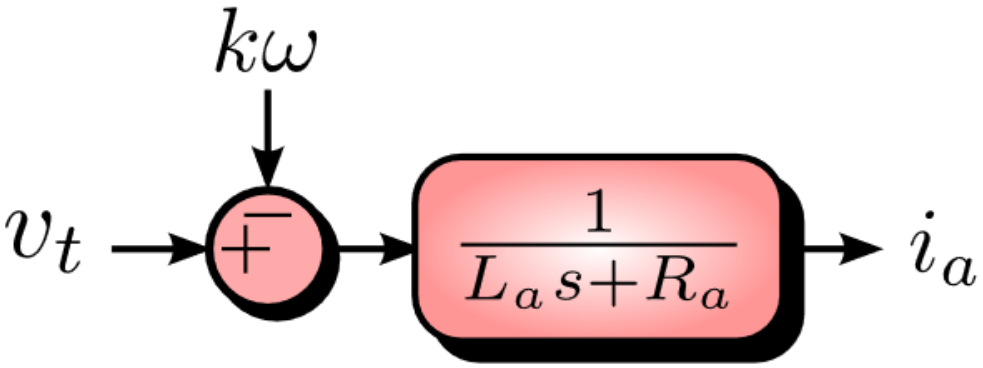
$$J \frac{d\omega}{dt} = T_e - T_L$$

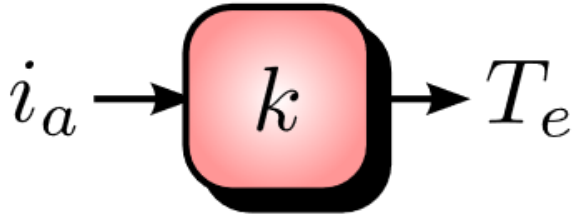


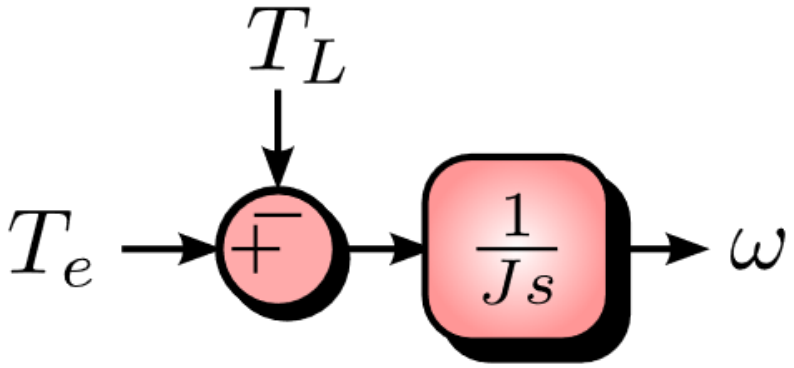
v_t	Tensión de armadura (lo que se manipula)
i_a	Corriente de armadura
L_a	Inductancia de armadura
R_a	Resistencia de armadura (mili Ohms)
k	Constante Nm/A o Vs/rad
ω	Velocidad rotacional (rad/s)
J	Inercia rotacional (bajita)
T_L	Torque de carga
T_e	Torque eléctrico

Modelado dinámico de la máquina dc de imanes permanentes

$$v_t = R_a i_a + L_a \frac{di_a}{dt} + k\omega \qquad T_e = k i_a \qquad J\frac{d\omega}{dt} = T_e - T_L$$

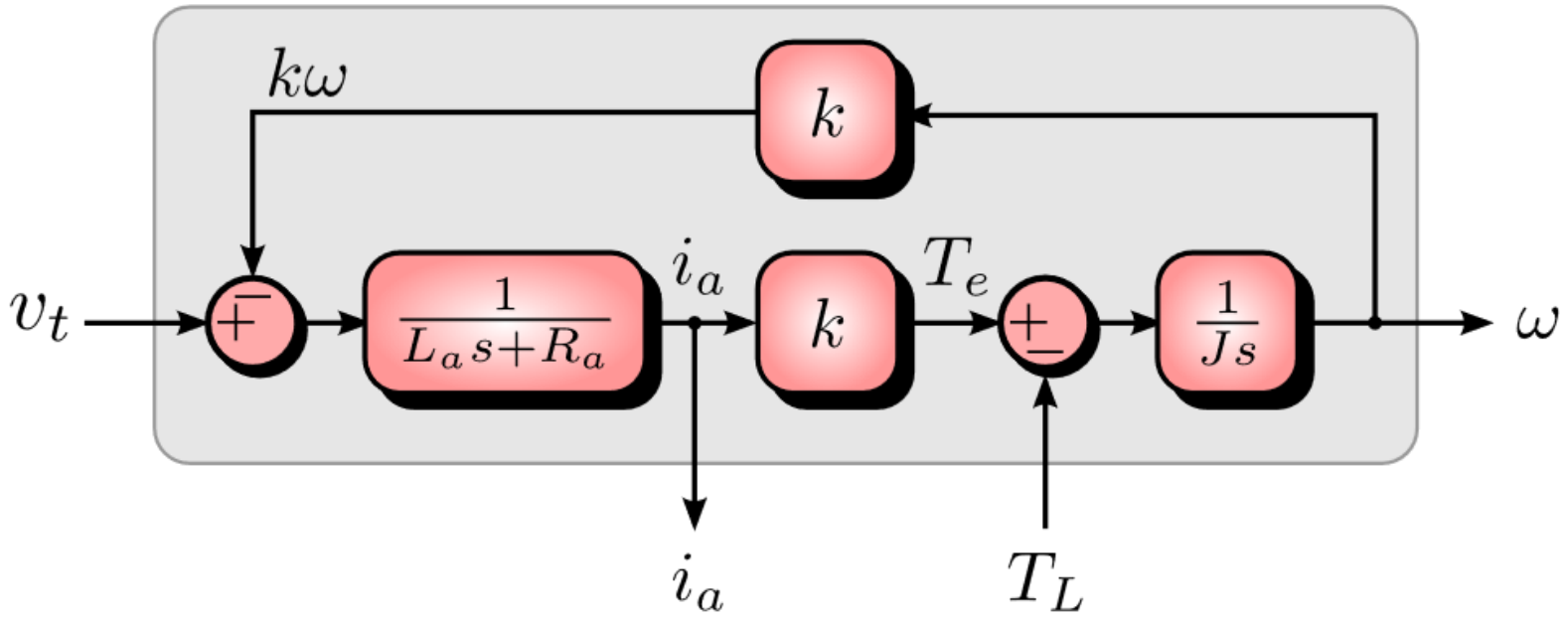






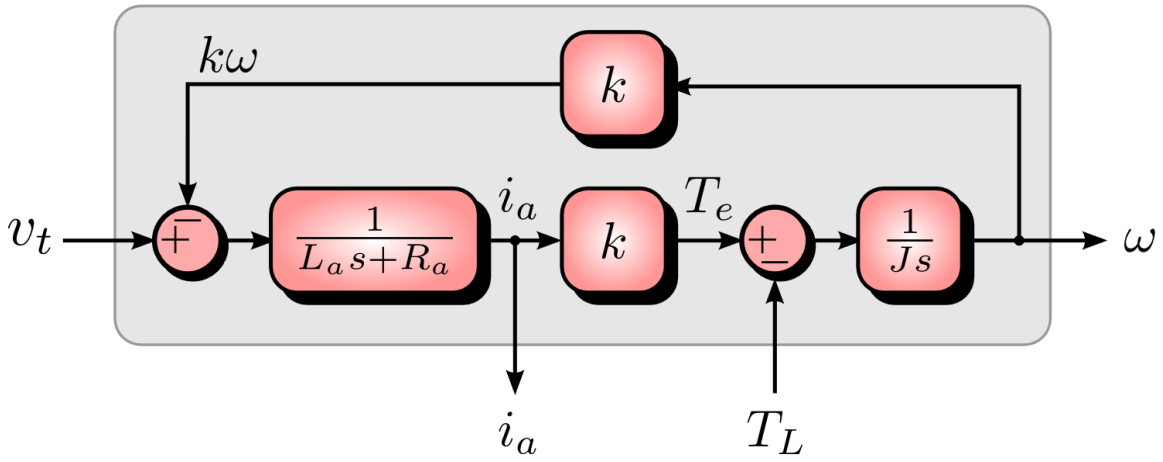
Modelado dinámico de la máquina dc de imanes permanentes

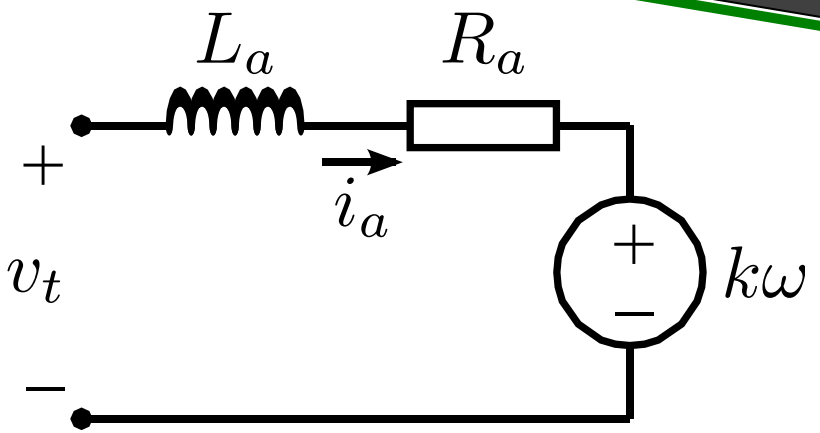
$$v_t = R_a i_a + L_a \frac{di_a}{dt} + k\omega \qquad T_e = k i_a \qquad J\frac{d\omega}{dt} = T_e - T_L$$

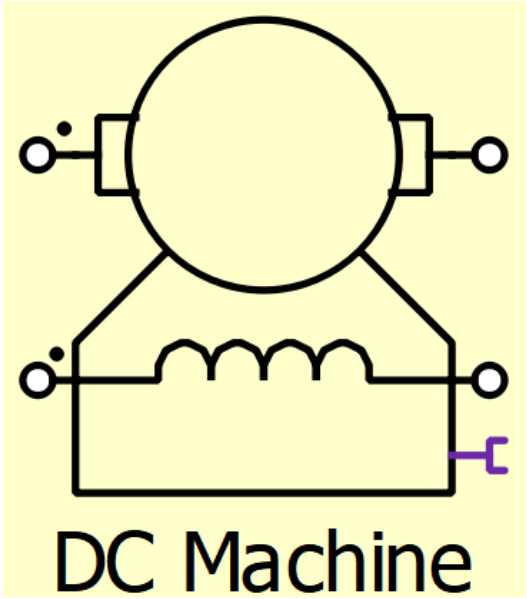


v_t	Entrada manipulable
T_L	Entrada no manipulable
i_a	Salida eléctrica
ω	Salida mecánica

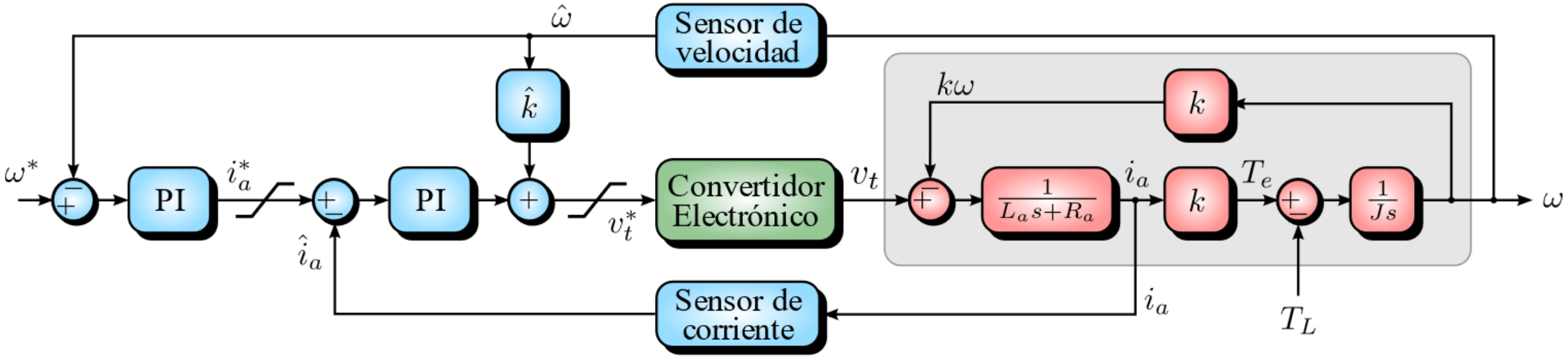
Modelado dinámico de la máquina dc de imanes permanentes





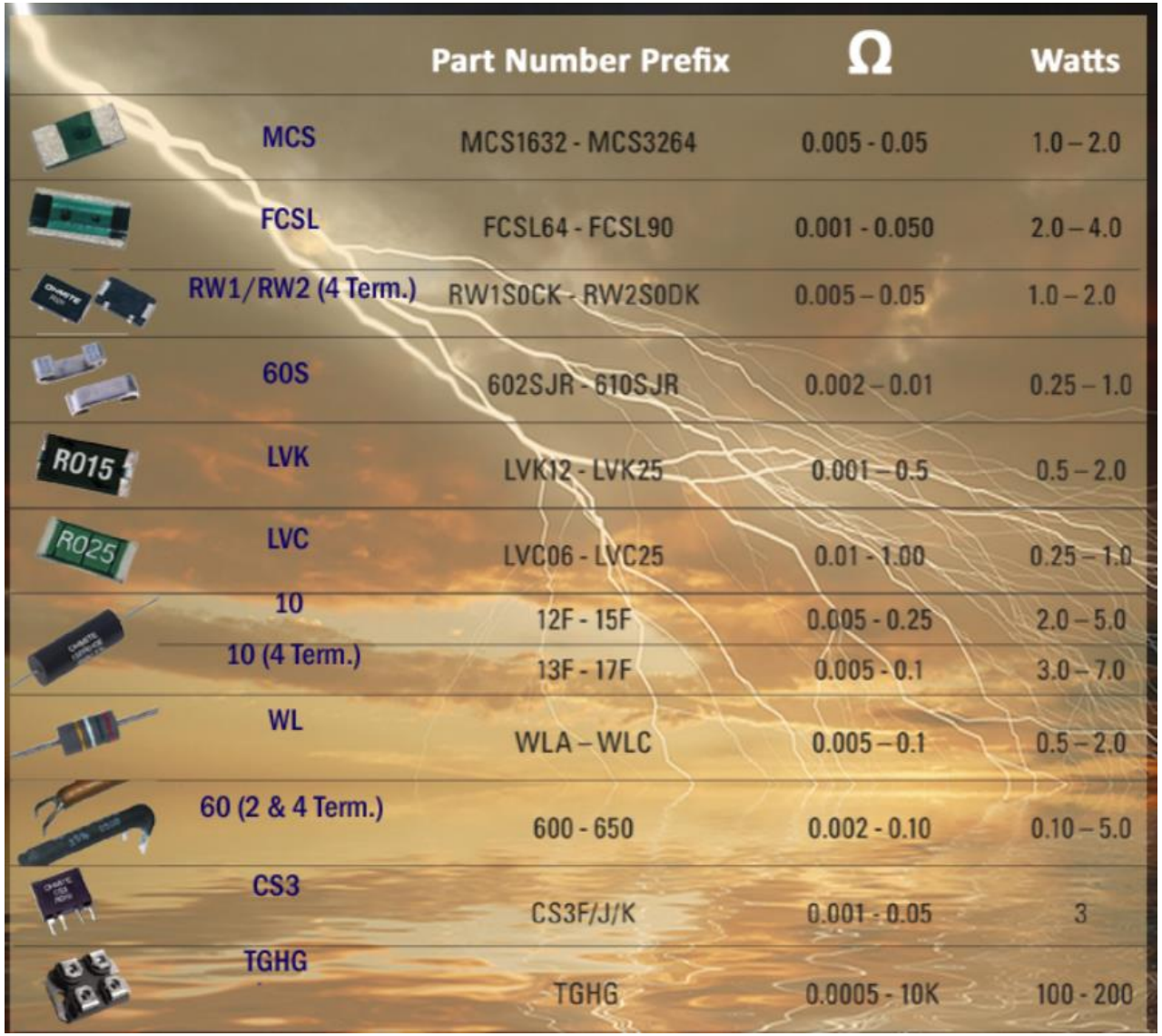


Sistema de control de la máquina dc de imanes permanentes



Un poquito de sensores de corriente…

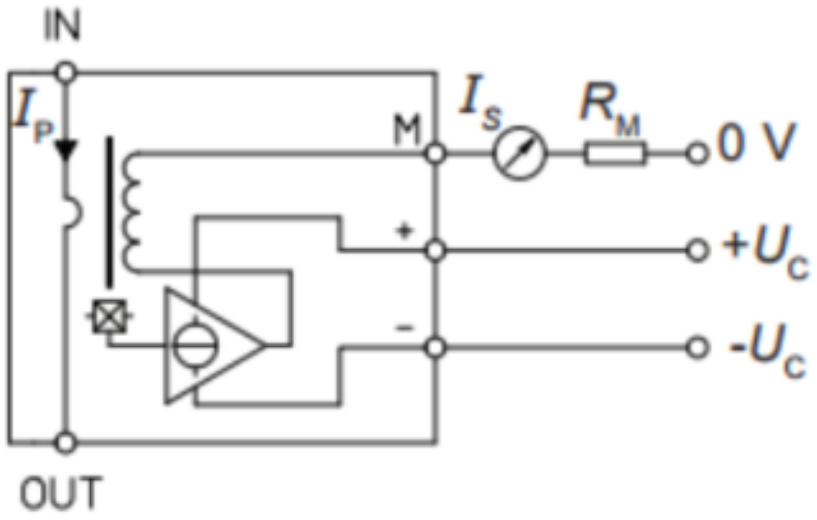
Sensores de corriente



	Part Number Prefix	Ω	Watts
MCS	MCS1632 - MCS3264	0.005 - 0.05	1.0 – 2.0
FCSL	FCSL64 - FCSL90	0.001 - 0.050	2.0 – 4.0
RW1/RW2 (4 Term.)	RW1S0CK - RW2S0DK	0.005 – 0.05	1.0 – 2.0
60S	602SJR - 610SJR	0.002 – 0.01	0.25 – 1.0
LVK	LVK12 - LVK25	0.001 – 0.5	0.5 – 2.0
LVC	LVC06 - LVC25	0.01 - 1.00	0.25 – 1.0
10	12F - 15F	0.005 - 0.25	2.0 – 5.0
10 (4 Term.)	13F - 17F	0.005 - 0.1	3.0 – 7.0
WL	WLA – WLC	0.005 – 0.1	0.5 – 2.0
60 (2 & 4 Term.)	600 - 650	0.002 - 0.10	0.10 – 5.0
CS3	CS3F/J/K	0.001 - 0.05	3
TGHG	TGHG	0.0005 - 10K	100 - 200

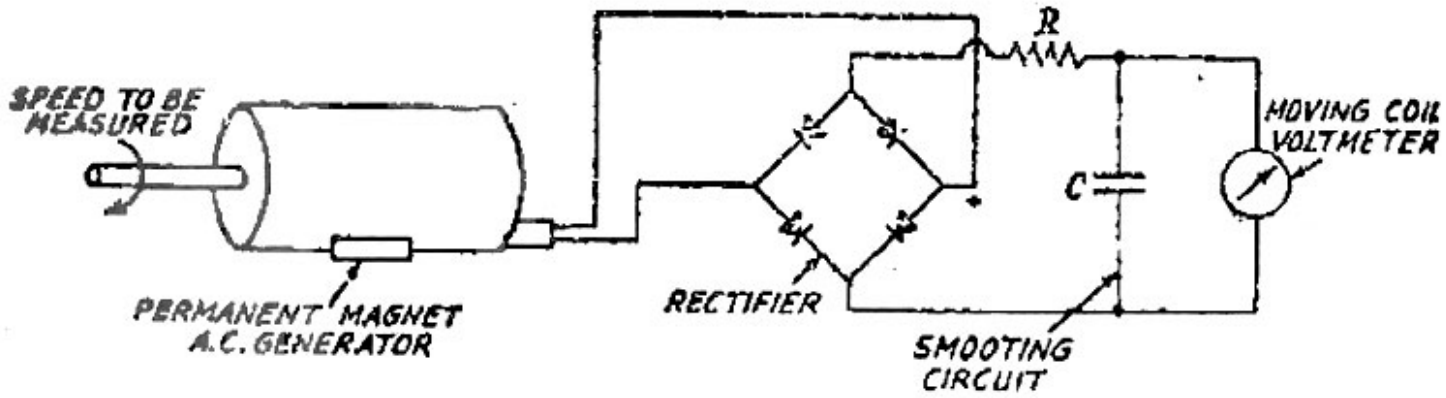
Un poquito de sensores de corriente…

Sensores de corriente

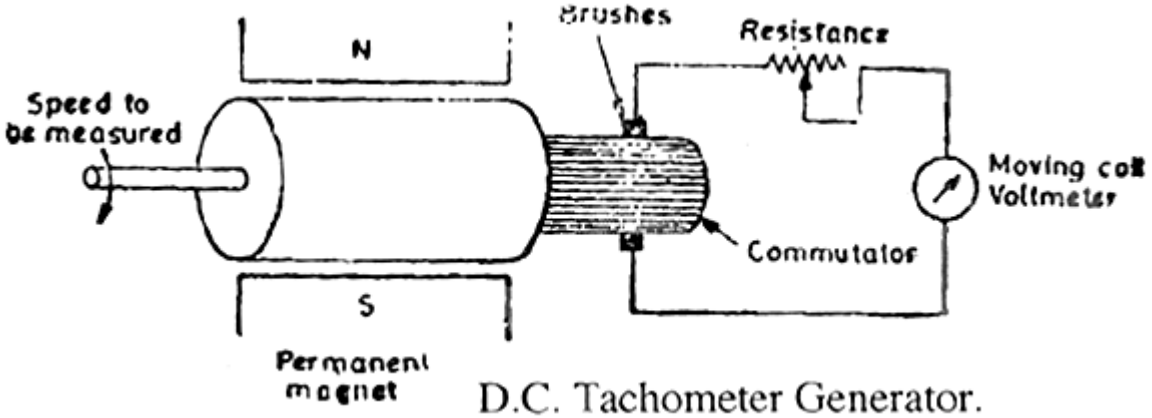


Un poquito de sensores de velocidad…

Tacogenerador…



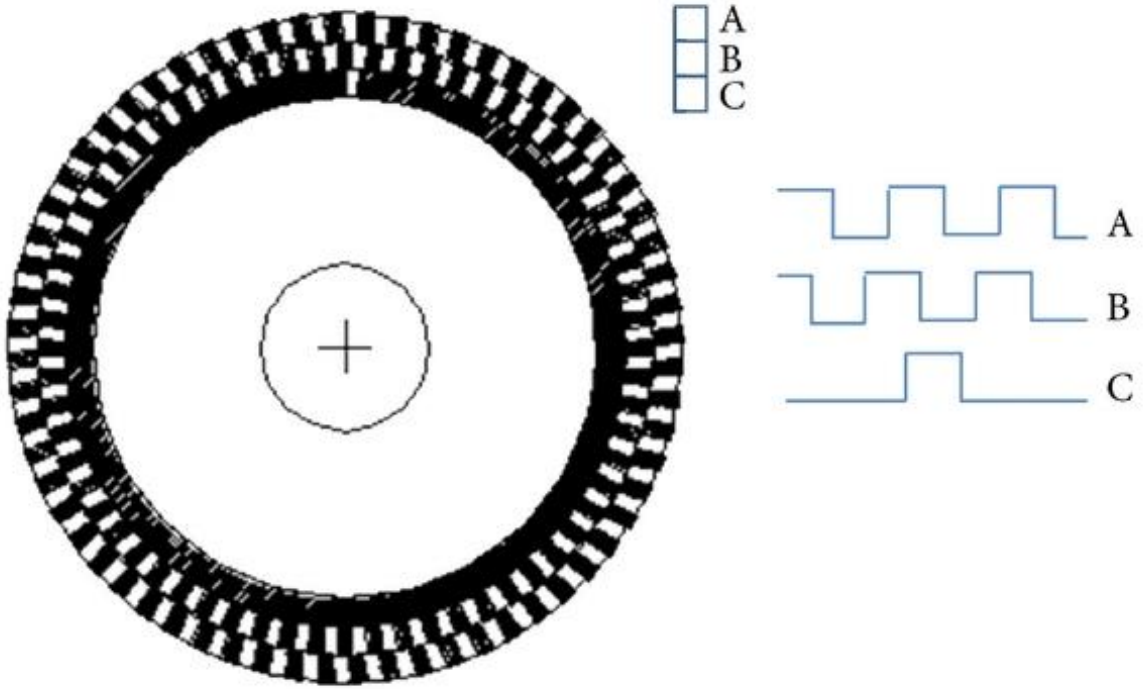
A.C. Tachometer Generator.



D.C. Tachometer Generator.

Un poquito de sensores de velocidad…

Encoders…

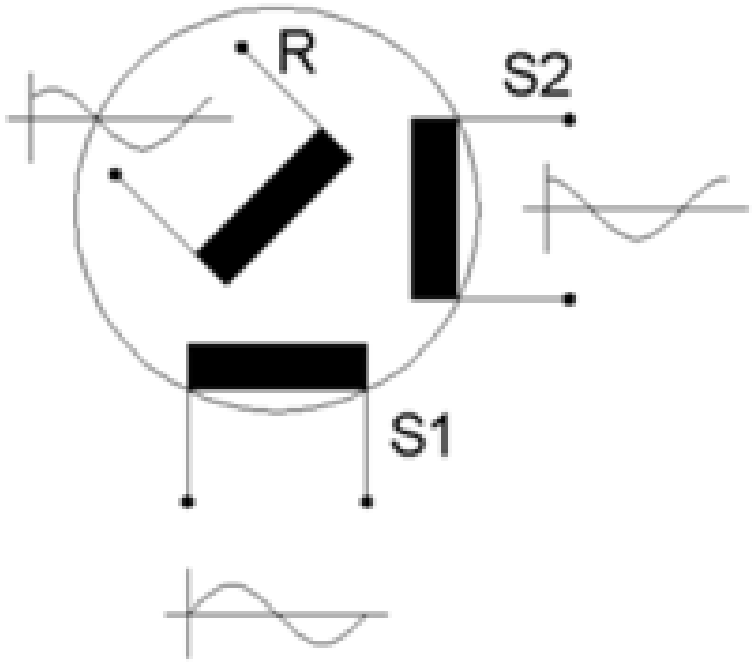


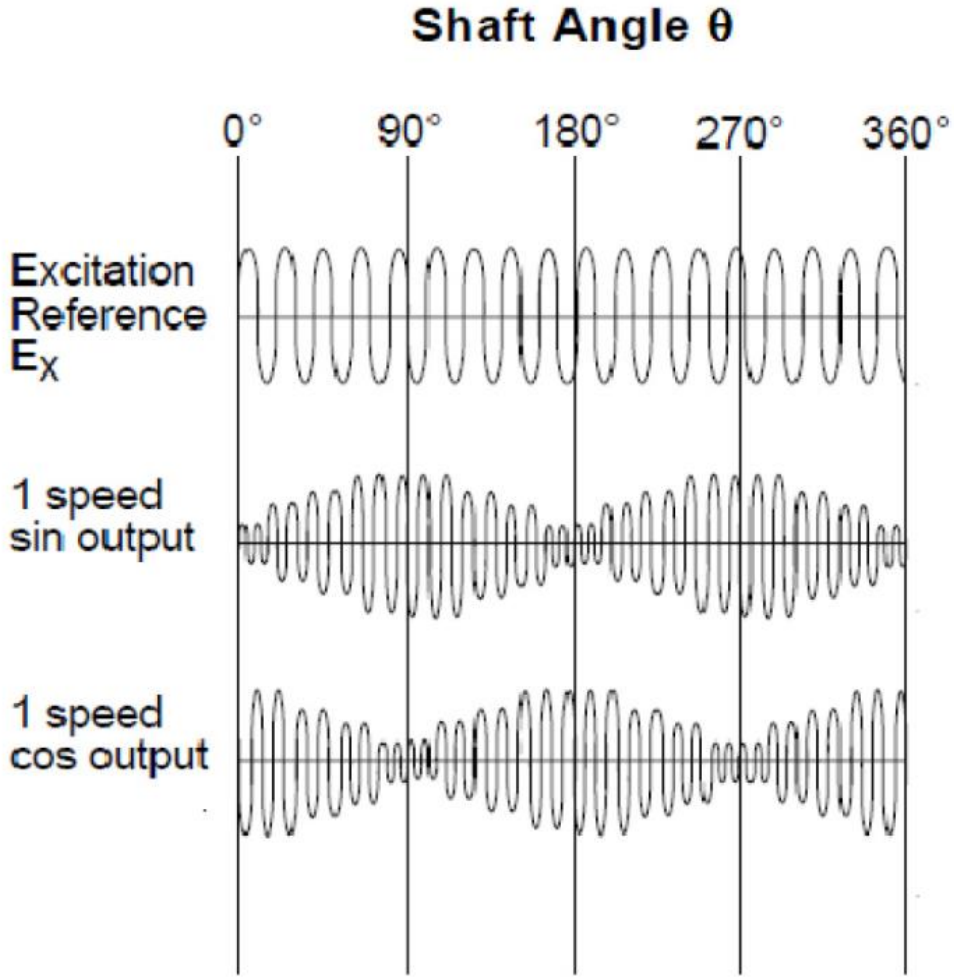
Incremental

Absolutos

Un poquito de sensores de velocidad…

Resolver…





Un poquito de sensores de velocidad…

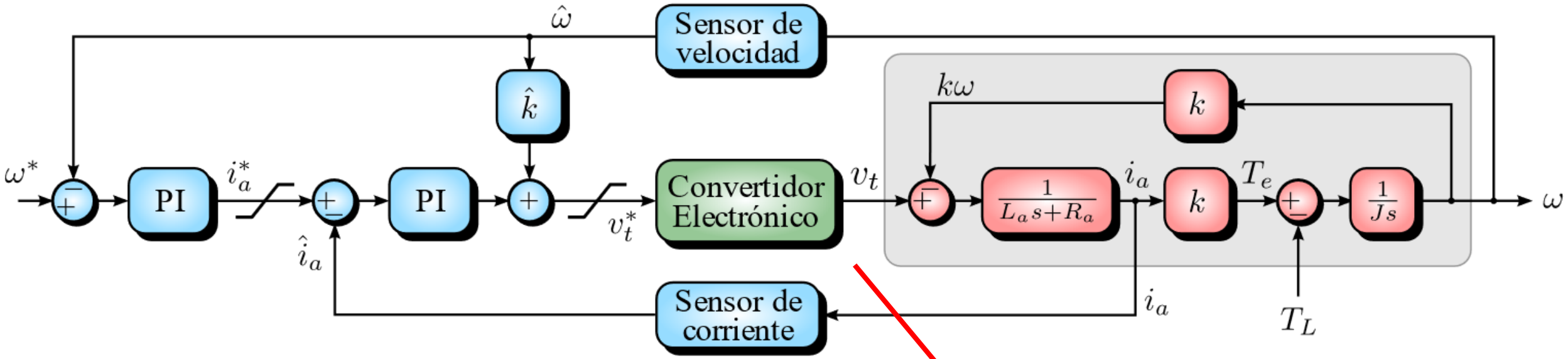
Comparación

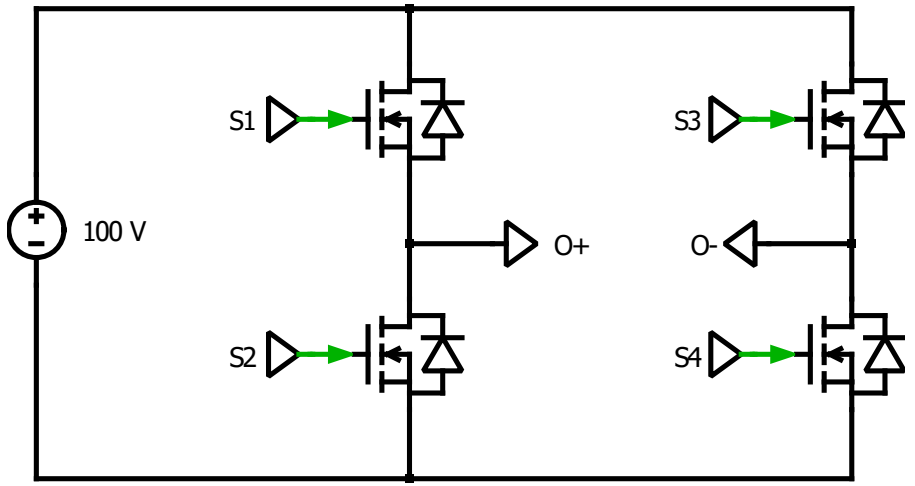
Absolute Encoder

Incremental Encoder

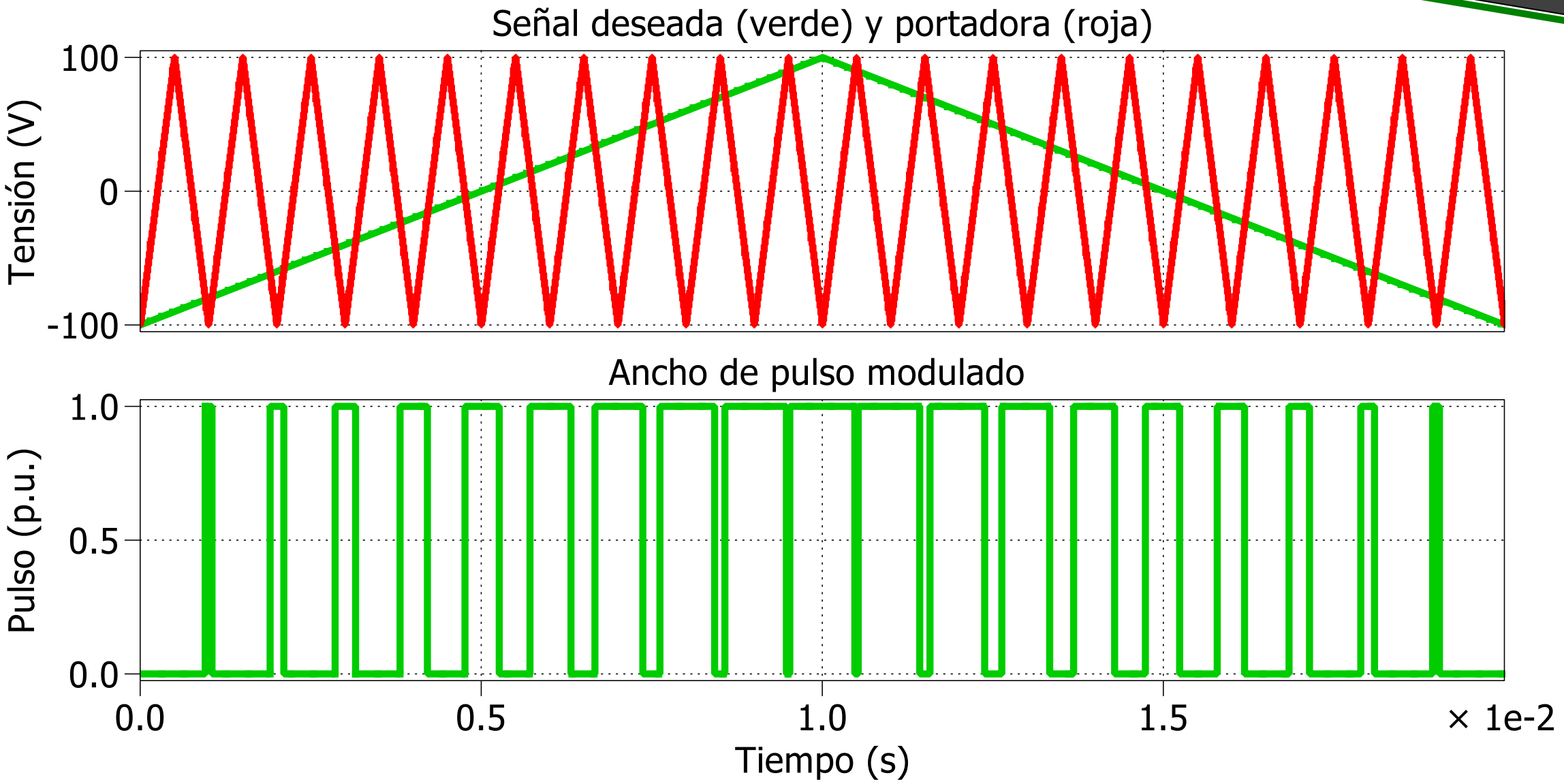
Resolver

El puente H…

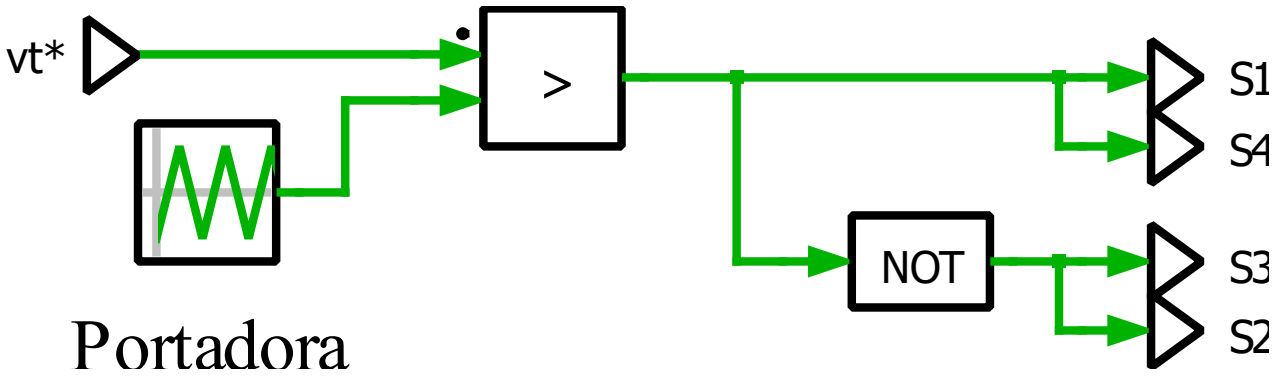

$\hat{\omega}$
Sensor de velocidad
$\hat{k}$
ω^*
PI
i_a^*
PI
v_t^*
Convertidor Electrónico
v_t
$\hat{i}_a$
Sensor de corriente
$k\omega$
k
$\frac{1}{L_a s + R_a}$
i_a
k
T_e
$\frac{1}{Js}$
ω
i_a
T_L

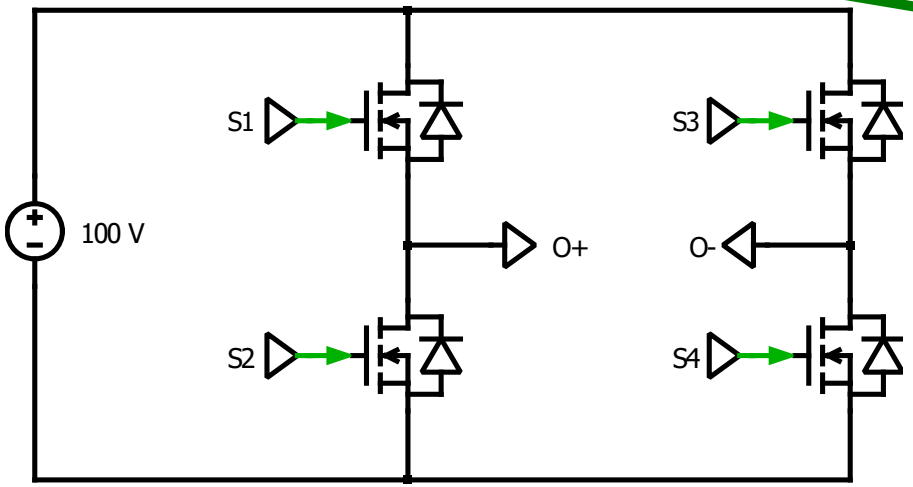

S1
S3
100 V
O+
O-
S2
S4

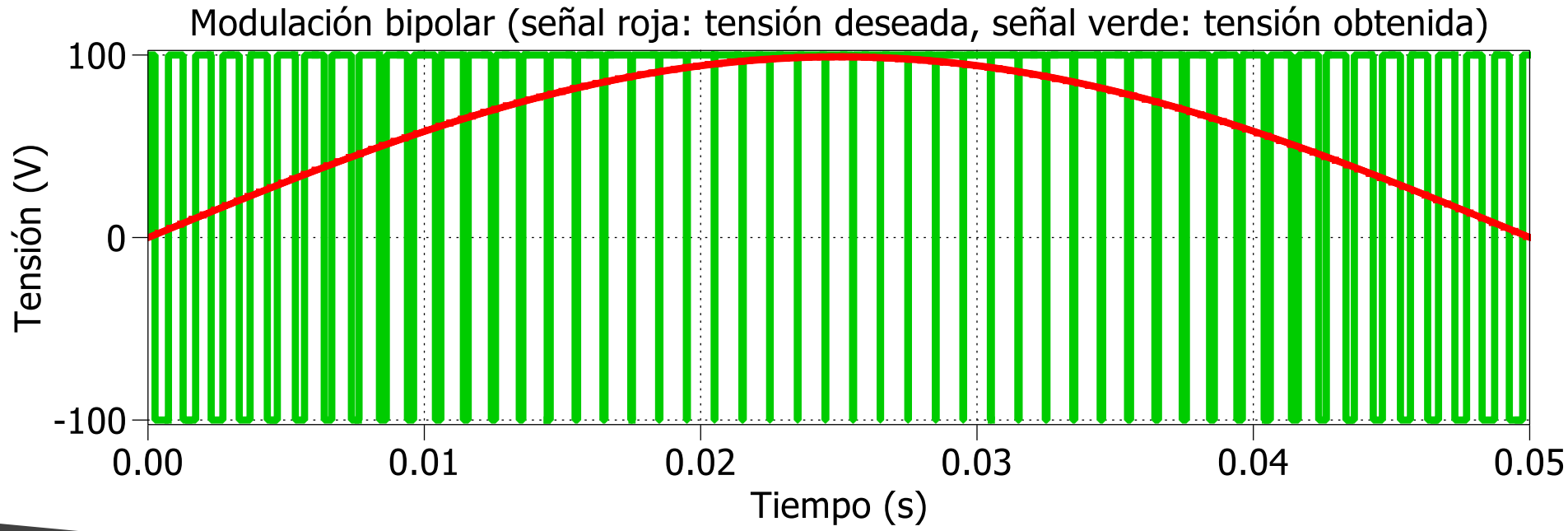
El puente H: modulación por ancho de pulso



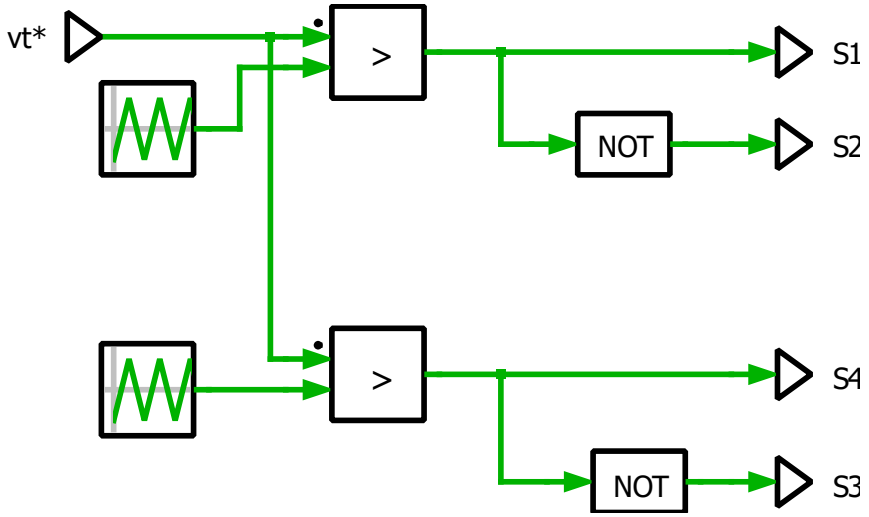
El puente H: modulación por ancho de pulso (modulación bipolar)

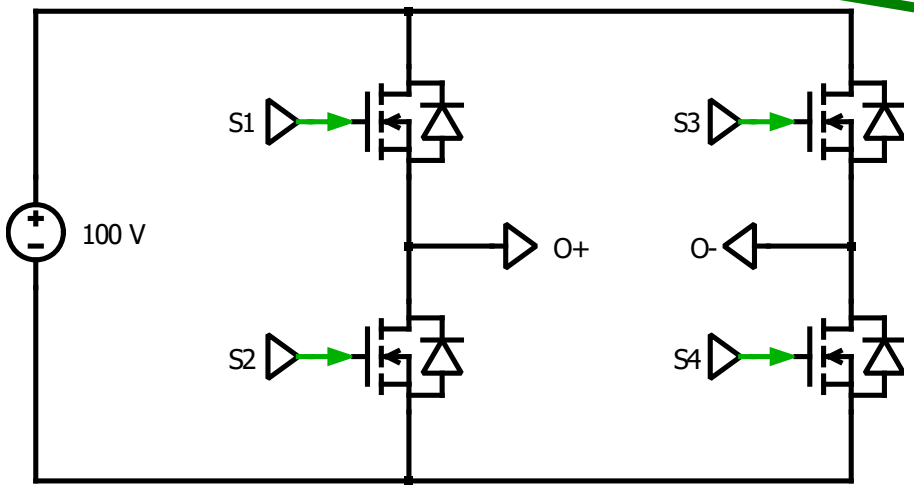


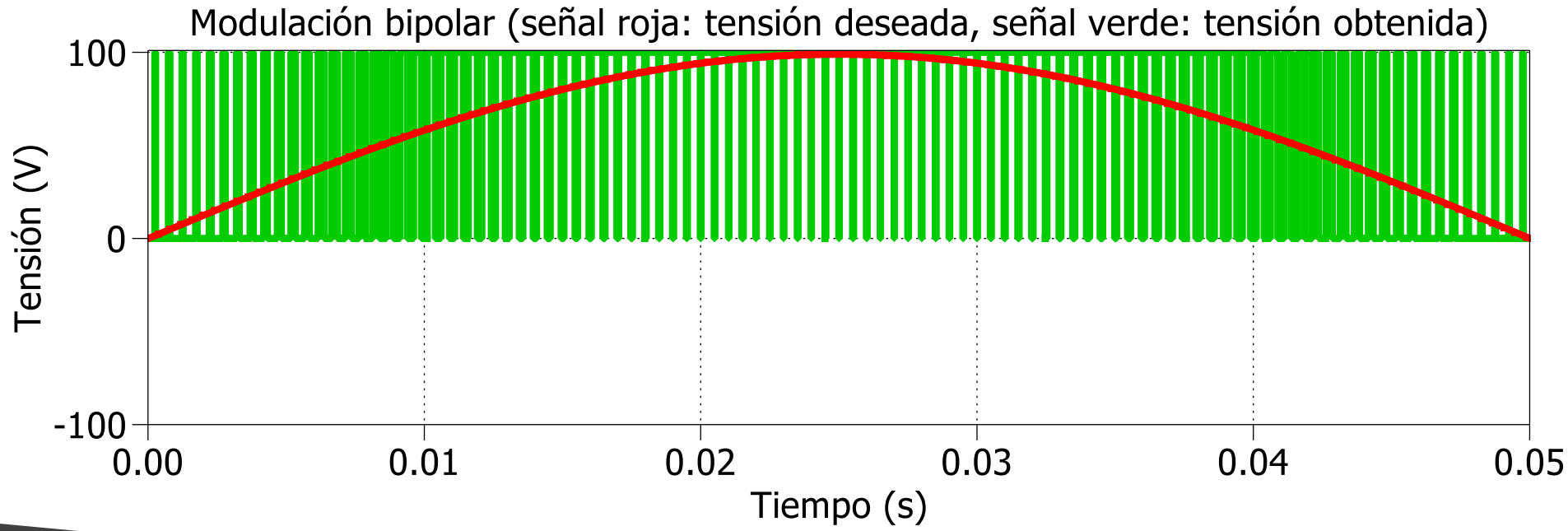




El puente H: modulación por ancho de pulso (modulación unipolar)







El puente H: modulación por ancho de pulso (comparación)