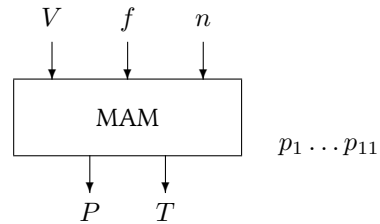


Block MAM

The MAM block calculates the torque of an asynchronous motor.



Name	MAM
Function	se0022
Inputs	3
Outputs	1
Parameters	11
Strings	0
Group	S

Inputs

- 1 Voltage V / V
- 2 Frequency f / s^{-1}
- 3 Rotational speed n / s^{-1}

Outputs

- 1 Required electrical power P_{el} / W
- 2 Torque T / N m

Parameters

- 1 Number of pole pairs N_p
- 2 Number of stator phases N_s
- 3 Ohmic stator resistance R_s / Ω
- 4 Ohmic rotor resistance R_r / Ω
- 5 Short-circuit stator reactance $\hat{X}_s$ / Ω
- 6 Short-circuit rotor reactance $\hat{X}_r$ / Ω
- 7 Open-circuit reactance $\hat{X}_m$ / Ω
- 8 Nominal power core loss $\hat{P}_c$ / W
- 9 Open-circuit friction loss $\hat{P}_f$ / W
- 10 Nominal voltage V_n / V

11 Nominal frequency f_0 / s^{-1}

Strings

None

Description The electrical power demand at the motor terminals is calculated by

$$P_{\text{el}} = N_p N_s \left(\frac{V^2}{\zeta^2} \left(\frac{R_s R_r^2}{s^2} + \frac{R_r X_m^2}{s} + R_s X_2^2 \right) + P_c \right)$$

where $s = (f - n)/n$ is the per-unit slip and ζ^2 a shortcut for

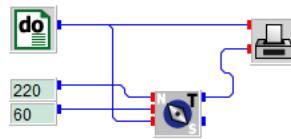
$$\zeta^2 = \left(\frac{R_s R_r}{s} + X_m^2 - X_s X_r \right)^2 + \left(\frac{R_2 X_s}{s} + R_s X_r \right)^2$$

The torque is simulated via

$$T = N_p N_s \left(\frac{R_r X_m^2 V^2}{\omega_r \zeta^2} - T_f \right)$$

where $\omega_r = 2\pi f$ is the rotor's angular frequency.

mam.vseit



A **DO** block varies the rotational speed of a motor axis between zero and 60 Hz in steps of 0.1 Hz. The voltage is fixed to 220 volt and the rotor frequency to 60 Hz by two **CONST** blocks.

The required electrical power is plotted by a **PLOT** block.

