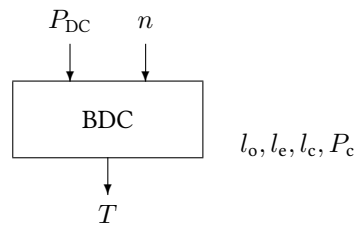


Block BDC

The BDC block calculates the torque of a brushless direct current motor.



Name	BDC
Function	se0007
Inputs	2
Outputs	1
Parameters	4
Strings	0
Group	S

Inputs

- 1 DC power P_{DC} / W
- 2 Rotational speed n / s^{-1}

Outputs

- 1 Torque T / N m

Parameters

- 1 Ohmic losses l_o / $W N^{-1} m^{-2}$
- 2 Electronic losses l_e / W
- 3 Core losses l_c / $W s^2$
- 4 Cut in power P_c / W

Strings

None

Description According to Lenz law the torque of a motor is calculated as

$$T = c_m I$$

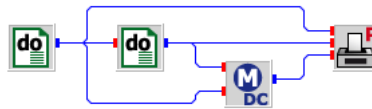
where $c_m = dlBN$ is the motor constant with rotor diameter d , conductor length l , magnetic field density B , and N the number of conductors (2 windings each).

When loss mechanisms like ohmic (copper) losses $c_1 T^2$, constant power for the supply of the power conditioning unit c_2 , and iron losses $c_3 n^2$ are considered the motor DC power can be modeled by the function

$$P_{DC} = 2\pi n T + c_1 T^2 + c_2 + c_3 n^2$$

where $2\pi n T = V_{emf} I$ is the mechanical power resulting from the induced back emf and the motor current.

bdc.vseit



The DC power of a brushless DC motor is varied between zero and 350 watt by a **DO** block. The rotational speed of the motor is varied between zero and 45 per second in steps of five by a second **DO** block.

The torque is plotted as a function of the DC power by a **PLOTP** block.

