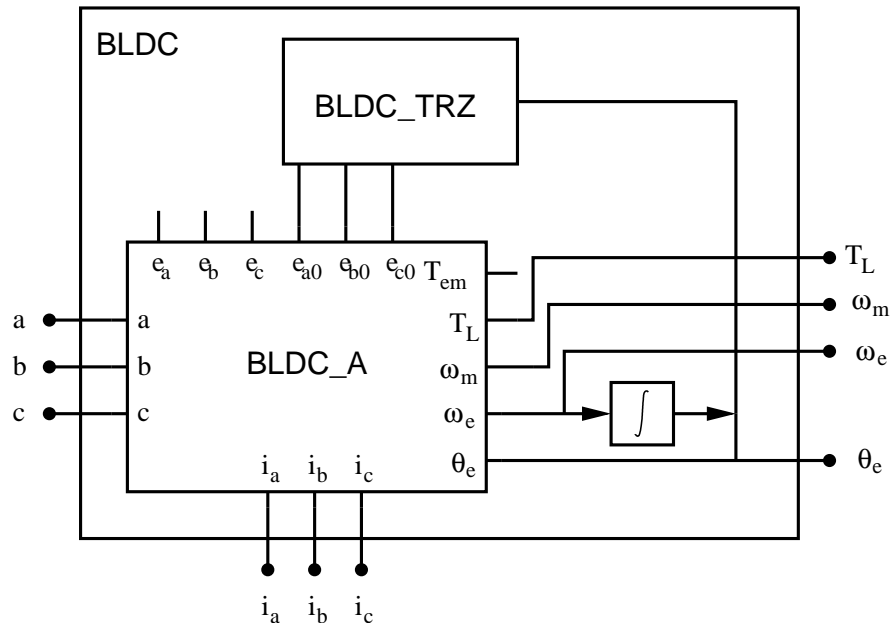


bldc1.ece



Attributes

```
mainnodes_anlg: a b c
main_var:
+ ia ib ic
+ we wm tl theta_e
aux_var:
+ e_a e_b e_c
+ e0_a e0_b e0_c
+ tem
iparms:
+ poles=6
rparms:
+ rs=0.98
+ ls=8.035m
+ j=21e-4
+ ke=0.5637
+ b_damp=0
outvar_anlg:
+ ia=var_of_ia
+ ib=var_of_ib
+ ic=var_of_ic
+ e0_a=var_of_e0_a
+ e0_b=var_of_e0_b
+ e0_c=var_of_e0_c
```

```

+ theta_e=var_of_theta_e
+ tem=var_of_tem

```

Description

bldc1.gme is a brushless DC machine model with terminals **a**, **b**, **c**. The three currents **ia**, **ib**, and **ic** are made available as general variables and can be used for controlling the motor. The internal implementation details are shown in the figure. The following model equations are used.

$$\begin{aligned}
L_s \frac{di_a}{dt} &= v_a - r_s i_a - e_a , \\
L_s \frac{di_b}{dt} &= v_b - r_s i_b - e_b , \\
L_s \frac{di_c}{dt} &= v_c - r_s i_c - e_c , \\
e_a &= k_e \omega_m e_{a0} , \\
e_b &= k_e \omega_m e_{b0} , \\
e_c &= k_e \omega_m e_{c0} , \\
e_a i_a + e_b i_b + e_c i_c &= \tau_{em} \omega_m , \\
\omega_e &= \frac{P}{2} \omega_m , \\
J \frac{d\omega_m}{dt} &= \tau_{em} - \tau_L - B \omega_m .
\end{aligned}$$

The above equations are implemented in the block **BLDC_A** in the figure. The block **BLDC_TRZ** is used to generate e_{a0} , e_{b0} , e_{c0} from θ_e .

The three terminal currents i_a , i_b , i_c , and the electromechanical torque τ_{em} are made available as output variables. In addition, the auxiliary variables e_{a0} , e_{b0} , e_{c0} , and θ_e are also available which enables the user to understand how e_{a0} , e_{b0} , e_{c0} are derived from θ_e .

AC behaviour is not implemented.