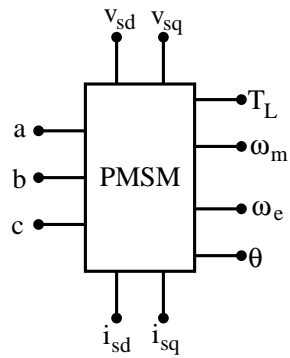


pmsm.ece



Attributes

```
mainnodes: a b c
outvar:
+   ia=cur(a)_of_pm0
+   ib=cur(b)_of_pm0
+   ic=cur(c)_of_pm0
+   tem=tem_of_pm0
stparms: wm0=0 theta0=0
main_var:
+   wm we theta tl
+   is_d is_q vs_d vs_q
iparms: poles=12
rparms: rs=0.9 ls=3.5m ke=0.2425 kt=0.63 j=4.7e-4
```

Description

pmsm.ece is a permanent magnet synchronous motor with terminals a, b, c. The model equa-

tions are given below.

$$\begin{aligned}
i_a &= \frac{2}{3} i_{s\alpha} , \\
i_b &= -\frac{1}{3} i_{s\alpha} + \frac{1}{\sqrt{3}} i_{s\beta} , \\
i_c &= -\frac{1}{3} i_{s\alpha} - \frac{1}{\sqrt{3}} i_{s\beta} , \\
\omega_e &= \frac{P}{2} \omega_m , \\
i_{sd} &= i_{s\alpha} \cos \theta + i_{s\beta} \sin \theta , \\
i_{sq} &= -i_{s\alpha} \sin \theta + i_{s\beta} \cos \theta , \\
V_{sd} &= V_{s\alpha} \cos \theta + V_{s\beta} \sin \theta , \\
V_{sq} &= -V_{s\alpha} \sin \theta + V_{s\beta} \cos \theta , \\
V_{s\alpha} &= \frac{3}{2} V_{an} , \\
V_{s\beta} &= \frac{\sqrt{3}}{2} (V_{bn} - V_{cn}) , \\
V_{sd} &= R_s i_{sd} + L_s \frac{di_{sd}}{dt} - L_s \omega_e i_{sq} , \\
V_{sq} &= R_s i_{sq} + L_s \frac{di_{sq}}{dt} + L_s \omega_e i_{sd} + k_e \omega_e , \\
T_{em} &= k_t i_{sq} , \\
J \frac{d\omega_m}{dt} &= T_{em} - T_L , \\
\frac{d\theta}{dt} &= \omega_e .
\end{aligned}$$

The three terminal currents **ia**, **ib**, **ic**, and the electromechanical torque **tem** are made available as output variables. **wm0** and **theta0** are the start-up values for ω_m and θ , respectively, in start-up simulation.

AC behaviour is not implemented.