

## indmc1.xbe

### Attributes

```
xbe name=indmc1 integrate=yes
# induction motor model
Jacobian: variable
input_vars: vqs vds tl
output_vars: wrm
aux_vars:
+ psids psidr psiqs psiqr
iparms:
+ poles=4
sparms:
rparms:
+ rs=0.435
+ lls=0.002
+ lm=0.0693
+ llr=0.002
+ rr=0.816
+ j=0.089
+ ls=0
+ lr=0
+ le=0
+ l1=0
+ l2=0
+ l3=0
+ x1=0
+ x2=0
stparms:
+ psids0=0
+ psiqs0=0
+ psidr0=0
+ psiqr0=0
+ wrm0=0
igparms:
outparms:
+ wrm
+ tem
+ vds
+ vqs
+ ia
+ ib
+ ic
```

### Description

indmc1.xbe is an induction machine model represented by the following equations. Note that  $v_{ds}$  and  $v_{qs}$  need to be computed from  $v_a$ ,  $v_b$ ,  $v_c$  and supplied to this template.

$$\begin{aligned} i_{ds} &= \frac{l_r}{l_m l_e} \psi_{ds} - \frac{1}{l_e} \psi_{dr} , \\ i_{dr} &= \frac{1}{l_m} \psi_{ds} - \left( \frac{l_s}{l_m} + 1 \right) i_{ds} , \\ i_{qs} &= \frac{l_r}{l_m l_e} \psi_{qs} - \frac{1}{l_e} \psi_{qr} , \end{aligned}$$

$$\begin{aligned}
i_{qr} &= \frac{1}{l_m} \psi_{qs} - \left( \frac{l_s}{l_m} + 1 \right) i_{qs} , \\
T_{em} &= \frac{3}{4} l_m = (i_{qs} i_{dr} + i_{ds} i_{qr}) , \\
\omega_r &= \frac{P}{2} \omega_{rm} , \\
\frac{d\psi_{ds}}{dt} &= v_{ds} - r_s i_{ds} , \\
\frac{d\psi_{qs}}{dt} &= v_{qs} - r_s i_{qs} , \\
\frac{d\psi_{dr}}{dt} &= -\omega_r \psi_{qr} - r_r i_{dr} , \\
\frac{d\psi_{qr}}{dt} &= \omega_r \psi_{dr} - r_r i_{qr} , \\
\frac{d\omega_r}{dt} &= \frac{P}{2} \frac{T_{em} - T_L}{J} .
\end{aligned}$$