s_indmc (subcircuit)

Attributes

```
inputs: tl va vb vc
outputs: wrm
parameters:
  name: none
  i1_k: computed
  j: 0.089
  llr: 0.002
  lls: 0.002
  lm: 0.0693
  m1_k: computed
  poles: 4
  rr: 0.816
  rs: 0.435
  s1_k1: computed
  s1_k2: computed
  s2_k1: computed
  s2_k2: computed
  s3_k1: computed
  s3_k2: computed
  s4_k1: computed
  s4_k2: computed
  s6_k1: computed
  s6_k2: computed
  s7_k1: computed
  s7_k2: computed
  s8_k1: computed
  s8_k2: computed
  s9_k1: computed
  s9_k2: computed
  x2: computed
```

Description

s_indmc is an induction machine model represented by the following equations. Note that v_{ds} and v_{qs} are computed from v_a, v_b, v_c within this subcircuit, using abc_to_dq.xbe.

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

$$
\begin{aligned}
\frac{d\psi_{qs}}{dt} &= v_{qs} - r_s i_{qs} \ , \\
\frac{d\psi_{dr}}{dt} &= -\omega_r \psi_{qr} - r_r i_{dr} \ , \\
\frac{d\psi_{qr}}{dt} &= \omega_r \psi_{dr} - r_r i_{qr} \ , \\
\frac{d\omega_r}{dt} &= \frac{P}{2} \frac{T_{em} - T_L}{J} \ .
\end{aligned}
$$