Module RFresPCB

Input Variables

Input Variables: instance=0 (bold) and model=9

name	description	default
Rs	RF resistance	50
Cp	Resistor shunt capacitance	0.3e-12
Ls	Series induuctance	8.5e-9
Llead	Parasitic lead induuctance	0.1e-9
Cshunt	Parasitic shunt capacitance	1e-10
Tc1	First order temperature coefficient	0.0
Tc2	Second order temperature coefficient	0.0
Tnom	Parameter extraction temperature	26.85
Temp	Simulation temperature	26.85

Output Variables

Output Variables: instance=0 (bold) and model=0 (red-underlined: temperature dependent)

name	description	dependencies

Nature/Discipline Definition

Nature

name	access	abstol	units
Current	I	1e-12	A
Charge	Q	1e-14	coul
Voltage	V	1e-6	V
Flux	Phi	1e-9	Wb
Magneto_Motive_Force	MMF	1e-12	A*turn
Temperature	Temp	1e-4	K
Power	Pwr	1e-9	W
Position	Pos	1e-6	m
Velocity	Vel	1e-6	m/s
Acceleration	Acc	1e-6	m/s^2
Impulse	Imp	1e-6	m/s^3
Force	F	1e-6	N
Angle	Theta	1e-6	rads
Angular_Velocity	Omega	1e-6	rads/s
Angular_Acceleration	Alpha	1e-6	rads/s^2
Angular_Force	Tau	1e-6	N*m

Discipline

name	potential	flow
logic		
electrical	Voltage	Current
voltage	Voltage	
current	Current	
magnetic	Magneto_Motive_Force	Flux
thermal	Temperature	Power
kinematic	Position	Force
kinematic_v	Velocity	Force
rotational	Angle	Angular_Force
rotational_omega	Angular_Velocity	Angular_Force

Model Equations

Notations used:

- *green: input parameter*
- *bar over: variable never used*
- *bar under: temperature dependent variable*
- *red: voltage dependent variable*

Initial Model

$$\mathrm{Tdiff} = (\mathrm{Temp} - \mathrm{Tnom});$$

$$\mathrm{FourKT} = ((4.0 \cdot 1.3806503\mathrm{e}{-23}) \cdot \mathrm{Temp});$$

$$\mathrm{Rst} = (\mathrm{Rs} \cdot ((1.0 + (\mathrm{Tc1} \cdot \mathrm{Tdiff})) + ((\mathrm{Tc2} \cdot \mathrm{Tdiff}) \cdot \mathrm{Tdiff})));$$

$$\mathrm{Rn} = \frac{\mathrm{FourKT}}{\mathrm{Rst}};$$

---------- end of Initial Model

$$I(\mathrm{n1}, \mathrm{n1}) <+ \mathrm{ddt}((\mathrm{Cshunt} \cdot V(\mathrm{n1}, \mathrm{n1})));$$

$$I(\mathrm{n1}, \mathrm{n1}) <+ \frac{V(\mathrm{n1}, \mathrm{n1})}{\mathrm{Rst}};$$

$$I(\mathrm{n1}, \mathrm{n1}) <+ \mathrm{ddt}((\mathrm{Cp} \cdot V(\mathrm{n1}, \mathrm{n1})));$$

$$I(\mathrm{n3}, \mathrm{n3}) <+ \mathrm{ddt}((\mathrm{Cshunt} \cdot V(\mathrm{n3}, \mathrm{n3})));$$

$$I(\mathrm{RT1}, \mathrm{RT1}) <+ (-V(\mathrm{nx}, \mathrm{nx}));$$

$$I(\mathrm{nx}, \mathrm{nx}) <+ V(\mathrm{RT1}, \mathrm{RT1});$$

$$I(\mathrm{nx}, \mathrm{nx}) <+ \mathrm{ddt}((\mathrm{Llead} \cdot V(\mathrm{nx}, \mathrm{nx})));$$

$$I(\mathrm{n2}, \mathrm{n2}) <+ (-V(\mathrm{ny}, \mathrm{ny}));$$

$$I(\mathrm{ny}, \mathrm{ny}) <+ V(\mathrm{n2}, \mathrm{n2});$$

$$I(\mathrm{ny}, \mathrm{ny}) <+ \mathrm{ddt}((\mathrm{Ls} \cdot V(\mathrm{ny}, \mathrm{ny})));$$

$$I(\mathrm{n3}, \mathrm{n3}) <+ (-V(\mathrm{nz}, \mathrm{nz}));$$

$$I(\mathrm{nz}, \mathrm{nz}) <+ V(\mathrm{n3}, \mathrm{n3});$$

$$I(\mathrm{nz}, \mathrm{nz}) <+ \mathrm{ddt}((\mathrm{Llead} \cdot V(\mathrm{nz}, \mathrm{nz})));$$

$$I(\mathrm{n1}, \mathrm{n1}) <+ \mathrm{white\_noise}(\mathrm{Rn}, \text{"thermal"});$$