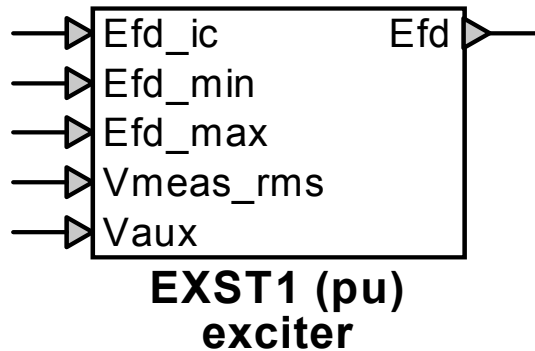


Machine control : exciter EXST1 pu



Machine control : exciter EXST1 pu.....	1
1 Description	1
1.1 Pins.....	1
1.2 Parameters	1
1.3 Input.....	2
1.4 Output.....	2
1.5 Representation	2

1 Description

This device is an implementation of an IEEE Type ST1 excitation system similar to PSS/E's EXST1 exciter model. This version of the exciter interprets all input and output values as per-unit quantities. For a version with input and output in physical units, use the device "exciter EXST1".

1.1 Pins

This device has six pins:

<i>pin</i>	<i>type</i>	<i>description</i>	<i>units</i>
Efd_ic	input pin	initial field voltage at t=0	pu(Efd_base)
Efd_min	input pin	minimum field voltage	pu(Efd_base)
Efd_max	input pin	maximum field voltage	pu(Efd_base)
Vmeas_rms	input pin	measured rms voltage	pu(V_base)
Vaux	input pin	auxiliary voltage order	pu(V_base)
Efd	output pin	field voltage	pu(Efd_base)

1.2 Parameters

The value of the following parameters must be defined:

<i>parameter</i>	<i>description</i>	<i>units</i>
Tr	time constant (lag) of voltage meter	s
Ta	time constant (lag) of regulator	s
Tc	time constant (lead) of transient filter	s

Tb	time constant (lag) of transient filter	s
Tf	time constant (lag) of feedback	s
Kf	gain of feedback	
Ka	gain of regulator	
Vimin	loop error low limit	pu(V_base)
Vimax	loop error high limit	pu(V_base)

(includes base conversion)

(includes base conversion)

1.3 Input

The input pins may be connected to any control signals.

The following inputs are available:

input	description	units
Efd_ic	initial field voltage at t=0	pu(Efd_base)
Efd_min	minimum field voltage	pu(Efd_base)
Efd_max	maximum field voltage	pu(Efd_base)
Vmeas_rms	measured rms voltage	pu(V_base)
Vaux	auxiliary voltage order	pu(V_base)

1.4 Output

The output value is the calculated field voltage, in per-unit of the base field voltage.

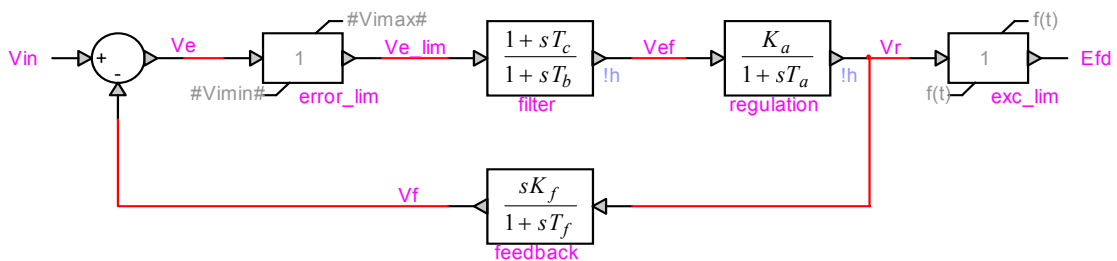
output	description	units
Efd	field voltage	pu(Efd_base)

1.5 Representation

The implementation of the model can be inspected by opening the device's subcircuit.

The model is self-initializing at t=0.

The dynamic representation of the model is the following:



where

$$V_{in} = V_{ref} - V_{meas_rms} + V_{aux} \quad (1)$$

with V_{meas_rms} filtered by $\frac{1}{1+sT_r}$

and with the value of V_{ref} calculated to produce $E_{fd} = E_{fd_ic}$ at $t=0$.

The internal signals are:

<i>signal</i>	<i>description</i>	<i>units</i>
Vin	control input	pu(V_base)
Ve	control error	pu(V_base)
Ve_lim	control error limited	pu(V_base)
Vef	control error filtered	pu(V_base)
Vr	regulator voltage	pu(Efd_base)
Vf	feedback	pu(V_base)