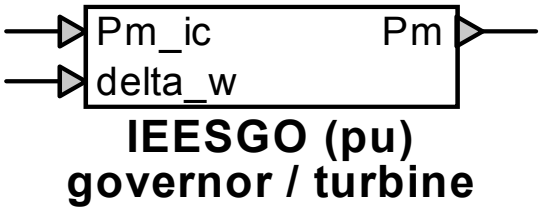
Machine control : governor/turbine IEESGO pu



1 Description

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

1.1 Pins

This device has three pins:

pin	*type*	*description*	*units*
Pm_ic	input pin	mechanical power at t=0	pu(S_base)
delta_w	input pin	speed deviation	pu(omega_base)
Pm	output pin	mechanical power	pu(S_base)

1.2 Parameters

The value of the following parameters must be defined:

parameter	*description*	*units*
K1	controller gain	
K2	reheater fraction	
K3	IP-LP fraction	
T1	time constant (lag) of controller	s
T2	time constant (lead) of controller	s
T3	time constant (lag) of governor	s
T4	time constant (lag) of steam inlet	s
T5	time constant (lag) of reheater	s

T6	time constant (lag) of IP-LP	s
Pmin	minimum power order	pu(S_base)
Pmax	maximum power order	pu(S_base)

1.3 Input

The input pins may be connected to any control signals.

The following inputs are available:

input	*description*	*units*
Pm_ic	mechanical power at t=0	pu(S_base)
delta_w	speed deviation	pu(omega_base)

1.4 Output

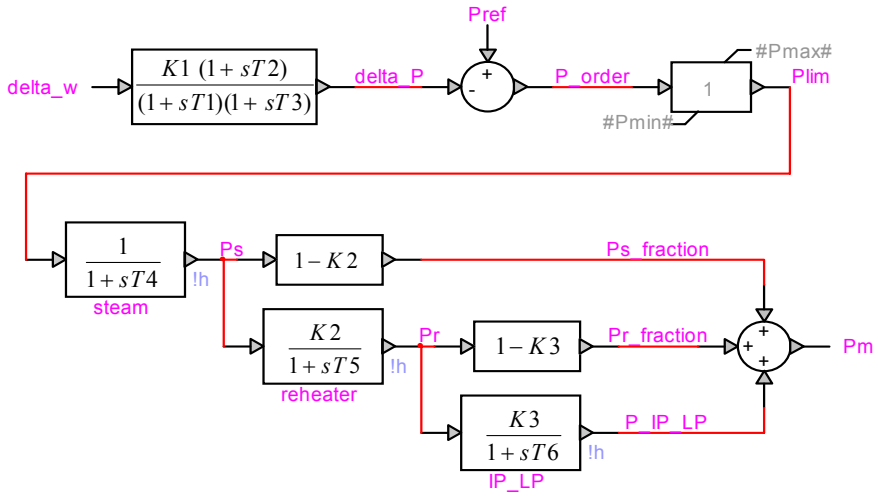
The output value is the calculated mechanical power, in per-unit of the machine base power.

output	*description*	*units*
Pm	mechanical power	pu(S_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:



with the value of P_{ref} calculated to produce $P_m = P_{m\_ic}$ at t=0 .

The internal signals are:

signal	*description*	*units*
delta_P	mechanical power deviation	pu(S_base)

P_order	power order	pu(S_base)
Plim	limiter power order	pu(S_base)
Ps	steam power order	pu(S_base)
Ps_fraction	steam power contribution	pu(S_base)
Pr	reheater power order	pu(S_base)
Pr_fraction	reheater power contribution	pu(S_base)
P_IP_LP	IP-LP power contribution	pu(S_base)