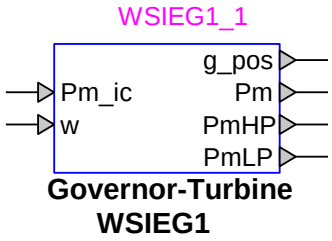
Exciters and Governors: Governor-Turbine WSIEG1



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1 Description

This device is an implementation of the WECC modified 1981 IEEE type-1 turbine-governor (see also [1]). Implementation details can be viewed by inspecting the subcircuit of this device.

1.1 Pins

This device has 6 pins:

Pin name	Type	Description	Units
Pm_ic	Input	Steady-state mechanical power at t = 0, for initialization	pu
w	Input	Mechanical speed	pu
g_pos	Output	Gate position	pu
Pm	Output	Turbine mechanical power	pu
PmHP	Output	High pressure mechanical power	pu
PmLP	Output	Low pressure mechanical power	pu

1.2 Parameters

The default set of parameters are obtained from [2].

1.2.1 Governor tab

The parameters on the Data tab are:

1. **Deadband db_1**: Intentional deadband
2. **Deadband hysteresis E_{RR}**: deadband hysteresis
3. **Governor gain K**: Governor gain
4. **Lag time constant T_1**: governor lag time constant

5. **Lead time constant T_2**: governor lead time constant
6. **Time constant T_3**: valve positioner time constant
7. **Maximum opening velocity U_0**: maximum opening velocity
8. **Minimum closing velocity U_c**: minimum closing velocity
9. **Maximum valve opening P_{max}**: maximum valve opening
10. **Minimum valve opening P_{min}**: minimum valve opening
11. **Deadband db_2**: Unintentional deadband

1.2.2 Turbine tab

The turbine tab allows to input:

1. **Time constant T_4**: steam flow time constant
2. **Time constant T_5**: first reheater time constant
3. **Time constant T_6**: second reheater time constant
4. **Time constant T_7**: crossover time constant
5. **HP turbine power fraction K_1**: high pressure turbine power fraction
6. **HP turbine power fraction K_3**: high pressure turbine power fraction
7. **HP turbine power fraction K_5**: high pressure turbine power fraction
8. **HP turbine power fraction K_7**: high pressure turbine power fraction
9. **LP turbine power fraction K_2**: low pressure turbine power fraction
10. **LP turbine power fraction K_4**: low pressure turbine power fraction
11. **LP turbine power fraction K_6**: low pressure turbine power fraction
12. **LP turbine power fraction K_8**: low pressure turbine power fraction

2 Initial conditions

The initial output is equal to the generator mechanical power (base for power) at t = 0 s.

3 References

[1] "Siemens Power Technologies International, PSS/E 33.1.1, Program Application Guide Volume 2, May 2012.

[2] P. Kundur, "Power System Stability and Control", McGraw-Hill 1994