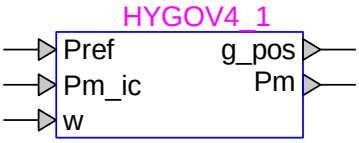
Exciters and Governors: Governor-Turbine HYGOV4



Governor-Turbine HYGOV4

Exciters and Governors: Governor-Turbine HYGOV4 1
1 Description 1
1.1 Pins 1
1.2 Parameters 1
1.2.1 Governor tab 1
1.2.2 Turbine tab 2
2 Initial conditions 2
3 References 2

Tshibain Tshibungu, Jean Mahseredjian, 12/18/2016 12:41 PM

1 Description

This device is an implementation of a general model for turbine and governor HYGOV4. This device is implemented as described in [1]. Implementation details can be viewed by inspecting the subcircuit of this device.

1.1 Pins

This device has 5 pins:

Pin name	Type	Description	Units
Pref	Input	Power reference from load controller LCBF1	pu
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

1.2 Parameters

The default set of parameters are obtained from [1].

1.2.1 Governor tab

The parameters on the Governor tab are:

1. **Deadband width db_1**: deadband width of speed governor
2. **Deadband hysteresis E_{RR}**: deadband hysteresis of speed governor
3. **Time constant T_G**: gate servo time constant
4. **Time constant T_P**: pilot servo valve time constant
5. **Time constant T_R**: dashpot time constant

6. **Permanent droop SIGMA**: permanent droop
7. **Temporary droop DELTA**: temporary droop
8. **Maximum opening velocity U_0**: maximum opening velocity
9. **Maximum closing velocity U_C**: maximum closing velocity
10. **Maximum valve opening P_{MAX}**: maximum valve opening
11. **Minimum valve opening P_{MIN}**: minimum valve opening
12. **Deadband width db_2**: deadband width of power gate

1.2.2 Turbine tab

The turbine tab allows to input:

1. **Time constant T_W**: water inertia time constant
2. **Damping factor D_T**: turbine damping factor
3. **Gain A_T**: turbine gain
4. **No-load flow Q_{NL}**: no-load flow at nominal head

2 Initial conditions

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

3 References

[1] "Review of Existing Hydroelectric Turbine-Governor Simulation Models", Argonne national Laboratory, August 2013