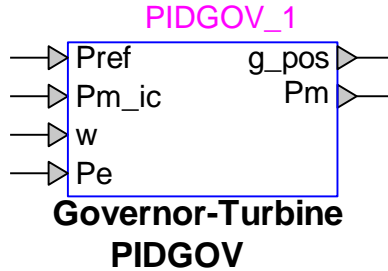


Exciters and Governors: Governor-Turbine PIDGOV



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1 Description

This device is an implementation of a general model for turbine and governor PIDGOV. 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 6 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
Pe	Input	Electrical power	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. **Permanent droop R_{perm}** : permanent droop
2. **Time constant T_{reg}** : speed detector time constant

3. **Gain K_p** : proportional gain
4. **Gain K_i** : integral gain
5. **Gain K_d** : derivative gain
6. **Time constant T_a** : controller time constant
7. **Time constant T_b** : gate servo time constant
8. **Maximum opening velocity V_{elmax}** : maximum gate opening velocity
9. **Maximum closing velocity V_{elmin}** : maximum gate closing velocity
10. **Maximum gate opening P_{MAX}** : maximum gate opening
11. **Minimum gate opening P_{MIN}** : minimum gate opening
12. Feedback switch control: see explanation below.

There are two possible selections for the feedback mode option:

1. Electrical power feedback
2. Gate position feedback

1.2.2 Turbine tab

The turbine tab allows to input:

1. **Factor A_{TW}** : factor multiplying T_w
2. **Time constant T_w** : water inertia time constant
3. **Damping factor D_T** : turbine damping factor

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