

ECEN 667 Homework 4

Due on October 19, 2023

1. Book 4.8
2. For the 37 bus case include with this homework (HW4_Prob2), analytically calculate the expected final frequency if the contingency is the outage of the generator at bus 53 (KYLE138). Note, all generators have TGOV1 models with $R=0.05$. Then perform the simulation in PowerWorld to verify your result.
3. Open in PowerWorld the case HW4_Prob3. This case models an IEEE3 governor at bus 4 and uses a signal generator for the infinite bus in which the infinite bus frequency is decreased from 60 to 59.5 Hz at time $t=1.0$ seconds, and set back to 60 Hz at time $t=11.0$ seconds. Using the values given for the IEEE3 parameters with the initial value of P_{mech} (1.0 pu), hand calculate the initial value of P_{ref} . For reference the block diagram is shown after problem 5.
4. Again open in PowerWorld the case HW4_Prob3 case. Plot the variation in the maximum and minimum value for the gen 4 P_{mech} over the course of the 30 second simulation when the value of R_{temp} is varied between 0.5 and 5 (use a 0.5 step variation).
5. PowerWorld case HW4_Prob5 contains a modified version of the B4_PIDTuning case discussed in class using an HYG3 governor with a poorly tuned PID (actually unstable). Using the Ziegler-Nichols approach, determine the values for the PID controller (with the PID set initially to poor values of 1.0 each); keep T_d fixed at 0.05 seconds.
6. Find a recent *IEEE Transactions on Power Systems* paper (not with Prof. Overbye as an author) on a topic associated with 667, and write a one page summary of the paper, including explaining why you think it is an important paper. This should be a minimum of 750 words.

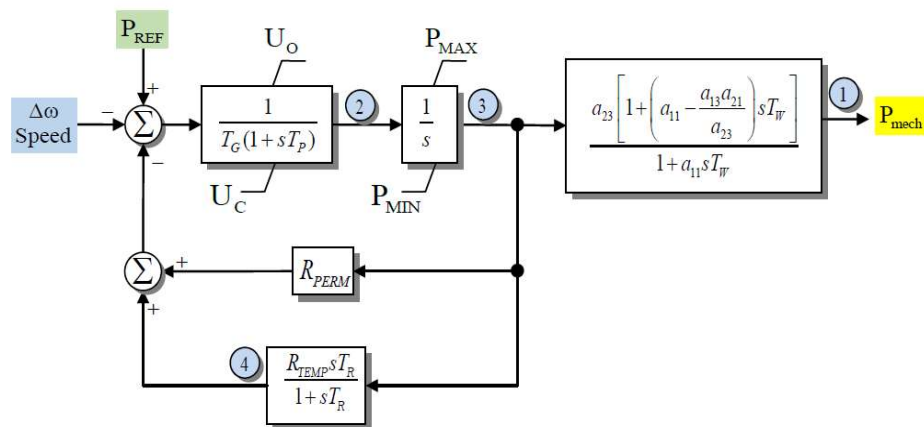


Figure 1: IEEE3 Block Diagram

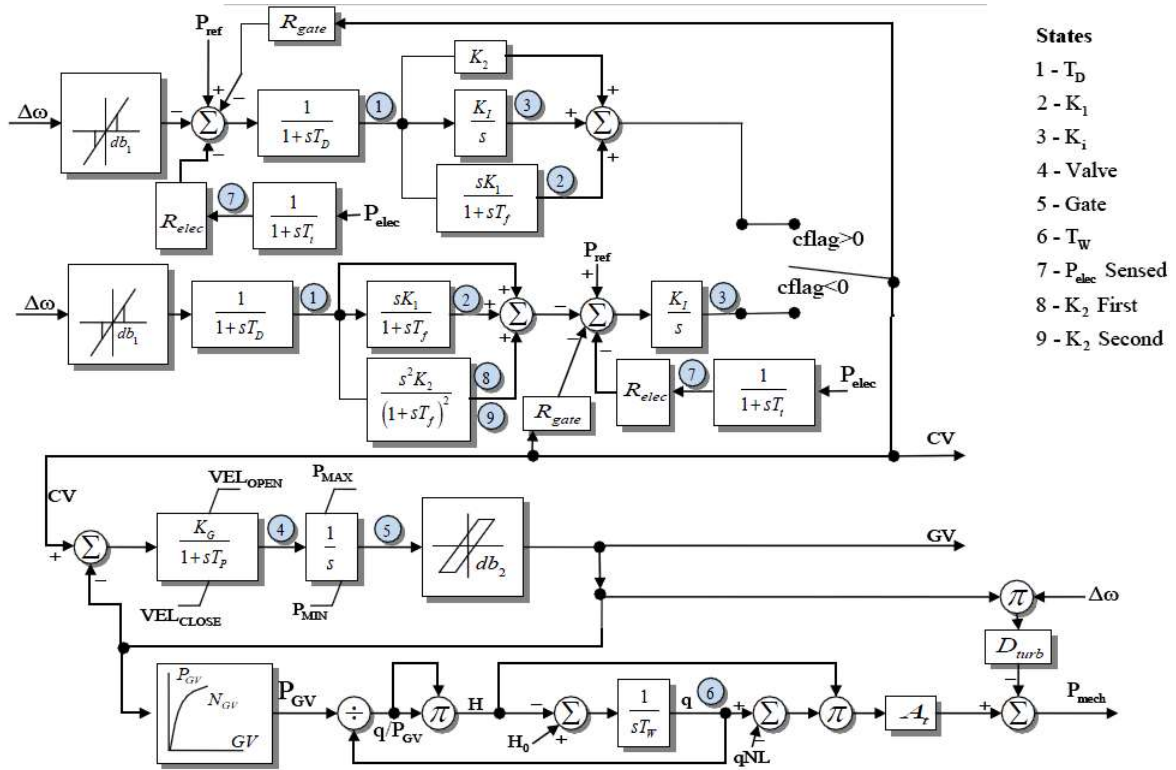


Figure 2: HYG3 Governor