ECE 667 Homework 3
Should be Done Before the First Exam, But Does Not Need to be Turned In

1. Book 5.2

2. Book 5.5 except changed so $X_d = 1.4$ and $X_q = 1.1$

3. Repeat the Two-Axis, no saturation, example initial condition calculation from class (i.e., the one with the four bus system) except assume that the current into the infinite bus is $1.0\angle 0°$ per unit. Give δ, V_d, V_q, I_d, I_q, E_q' and E_d'.

4. Using the B4_GENSAL_SAT system presented in class, manually calculate the initial values for all the state variables and the field voltage if the real and reactive power output of the generator is changed so per unit power delivered to the infinite bus is 2 + j0.2, and the saturation is changed so S(1.0)=0.02 and S(1.2) = 0.1. Also give the saturation function coefficients.

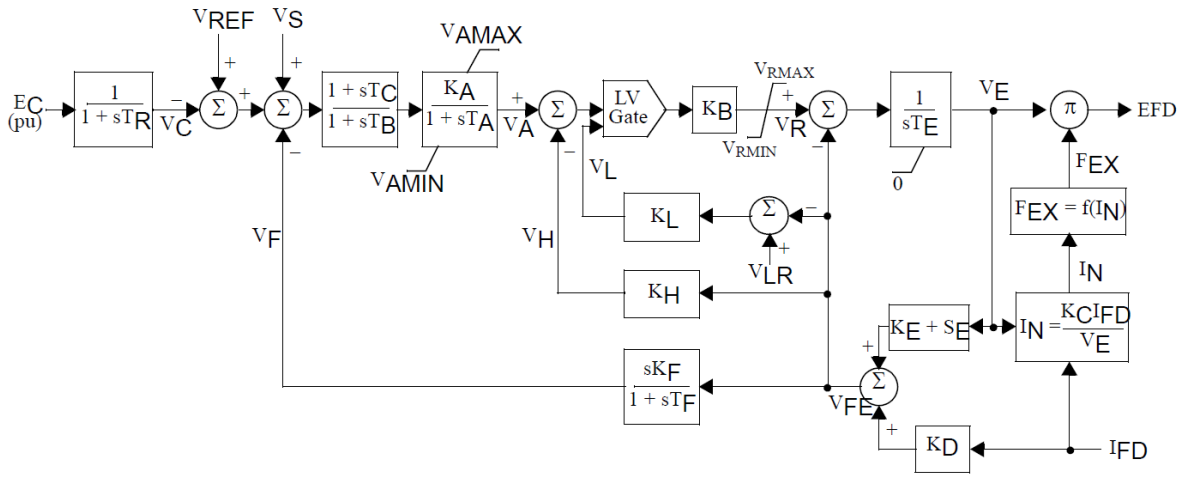
5. Take the B4_GENHROU_SAT PowerWorld Simulator case and modify the initial fault so it is a self-clearing fault at Bus 1. Hence the system returns to its prefault conditions (assuming it is stable). Determine how the system damping and critical clearing time are affected by parameter changes in the most sensitive parameters at the Bus 4 generator. For this problem as a simple means of quantifying damping you can use the ratio of the generator 4 delta maximum positive deviation from its initial value on the fourth swing to its first swing value.

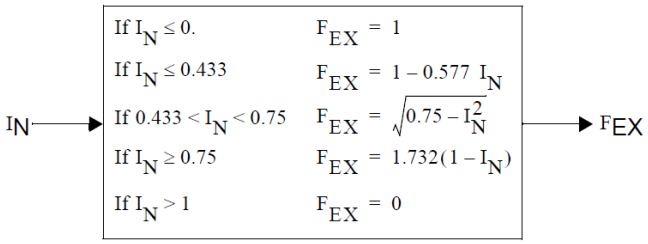
4. Book 4.1

5. Book 4.3

6. The block diagram for an EXAC2 exciter is shown below (reproduced from the PSSE manual). With an initial voltage and field current of 3.1866 and a terminal voltage of 1.0946, manually calculate the initial values of Ve, Va and Vref/

   You may ignore the LV gate. Assume Tr = 0.05, Tb=1, Tc=2, Ka=300, Ta=0.02, Vamax=8, Vamin= -8, Kb=20, Vrmax=10, Vrmin=-10, Te=0.8, Kl=10, Kh=0, Kf=0.0, Tf=1, Kc=0.3, Kd=0, Ke=1, VLR=4.4, E1=3.3, SE1=0.03, E2=4.4, SE2=0.08.





V_S = VOTHSG + VUEL + VOEL