

ECE 476 – Power System Analysis Fall 2017

Homework 7

In-class quiz: Tuesday, October 24, 2017

Problem 1. Problem 6.38 of GS&O, 6th Edition

Problem 2. Problem 6.39 of GS&O, 6th Edition

Problem 3. Problem 6.40 of GS&O, 6th Edition

Problem 4. Write a MATLAB script to solve the following system of equations via Newton-Raphson:

$$\begin{aligned} 2x_1^2 + x_2^2 &= 8, \\ x_1^2 - x_2^2 + x_1x_2 &= 4. \end{aligned}$$

Turn in the code and the output.

Problem 5. This problem requires you to compute a solution in MATLAB again. Consider the system shown in Figure 1, which was discussed in class. First suppose $V_1 = 1$, $\theta_1 = 0^\circ$, $V_2 = 0.95$, $P_2 = 1.5$, and $X_l = 0.2$ (all in p.u.). Iterate θ_2 until it converges using the Newton-Raphson MATLAB code. Use initial guess of 0° , 60° , and 90° for θ_2 and comment on the results. Note that this is a scalar case of Newton Raphson. Finally, note that in a realistic load bus, the voltage is a variable and is not fixed.

Now consider the more realistic case of having only V_1 is fixed and V_2 being a variable. The other parameters are same as above and $Q_2 = 0.15$. Find θ_2 and V_2 with initial guesses of 0° and 1, respectively, using MATLAB (this is a vector case of N-R). Turn in the MATLAB code and the outputs.

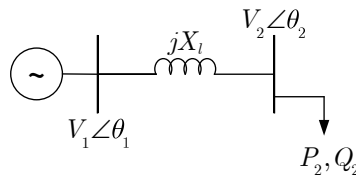


Figure 1: System diagram.