EE303 — Energy Systems and Power Electronics

Lecture 23. Power flow analysis

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Today's objectives

- EXTEND the Newton–Raphson algorithm to the 2-D and the most general multi-dimensional case
- APPLY the Newton–Raphson algorithm to solve a power flow problem

Example T7.3, p. 94

Example

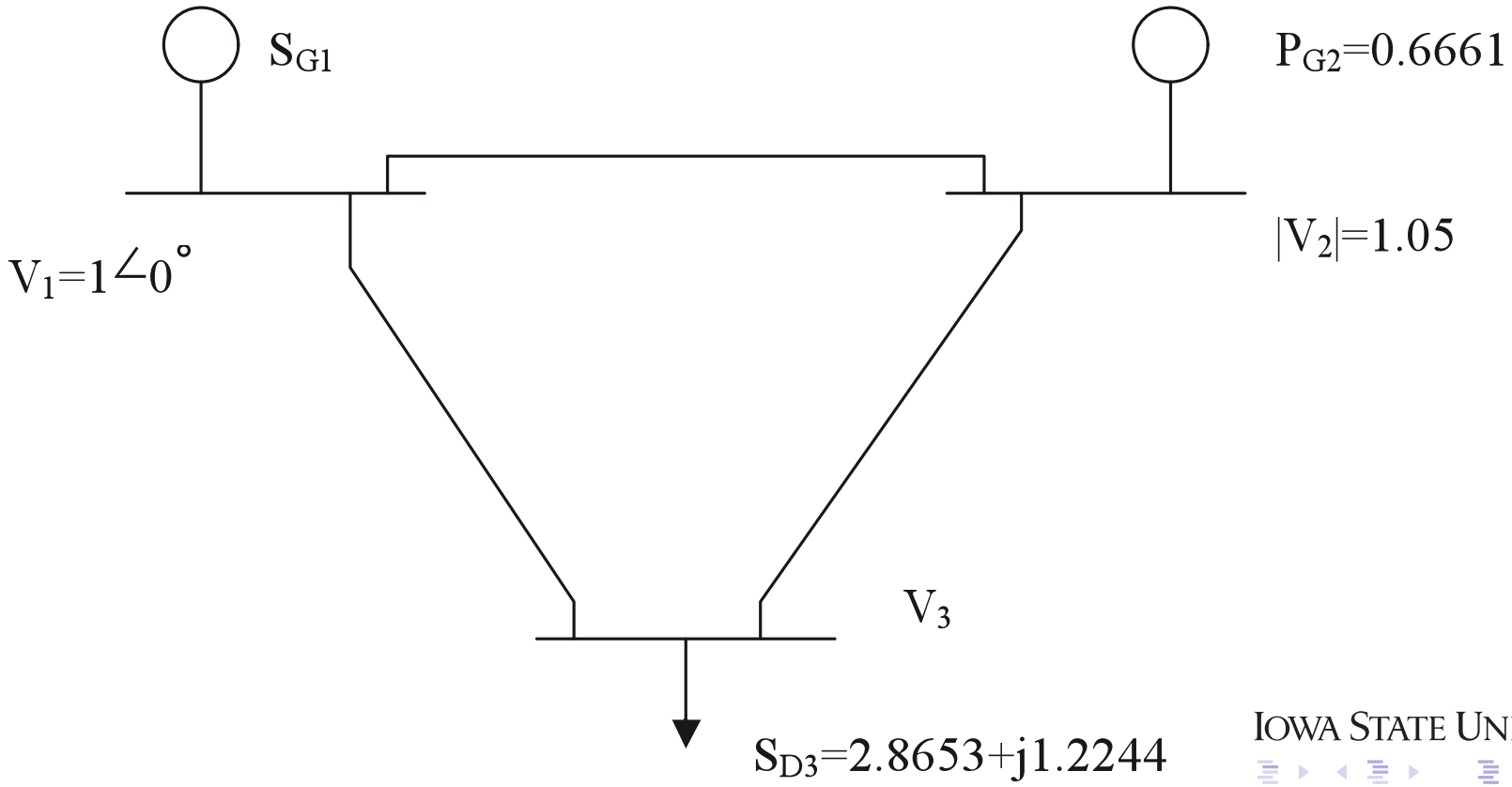
Solve the following two equations algebraically, and using N–R:

$$2x_1^2 + x_1 x_2 - x_1 - 2 = 0$$
$$x_1^2 - x_2 = 0$$

For the N–R solution, assume that $\left(x_1^{(0)}, x_2^{(0)}\right) = (0.9, 1.1)$.

Example T7.4, p. 100

Find θ_2, V_3, θ_3, S_{G1}, and Q_{G2} for the system shown below. In the transmission system, all the shunt elements are capacitors with an admittance $y_C = j0.01$ p.u., while all the series elements are inductors with an impedance of $z_L = j0.1$ p.u.



Reading material

The material we covered today corresponds to:

- Module T7, pp. 79–111 of the class notes
- Chapter 14.1–14.2, pp. 419–427 of textbook