

EE303 — Energy Systems and Power Electronics

Lecture 15. Electric power generation

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Today's objectives

- **DERIVE** the equivalent circuit of a synchronous generator
- **COMPUTE** and **APPLY** active and reactive power equations
- **DISCUSS** generators' voltage and speed control systems

Example G1.1, p. 45

Example

A 10 MVA, 3 phase, Y-connected, two pole, 60 Hz, 13.8 kV (line to line) generator has a synchronous reactance of 20 ohms per phase. Find the excitation voltage E_f if the generator is operating at rated terminal voltage and supplying:

- 300 Amperes at 30 degrees lagging
- 300 Amperes at 30 degrees leading

Reading material

The material we covered today corresponds to:

- Module G1, pp. 40–58 of the class notes
- Chapter 12.1, pp. 309–313 of textbook
- Chapter 12.4, pp. 339–358 of textbook
- Supplementary notes on synchronous generators (available online)