

EE303 — Energy Systems and Power Electronics

Lecture 6. Three-phase circuit analysis

Prof. Dionysios Aliprantis

Electrical & Computer Engineering

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Today's objectives

- **IDENTIFY** Y (wye) and Δ (delta) connections
- **COMPREHEND** currents and voltages in Y and Δ
- **CONVERT** a Δ -connected load to Y-connected (and vice versa)
- **CALCULATE** complex power in three-phase circuits
- **ANALYZE** symmetric three-phase circuits using the per-phase method

Problem 2, p. 22, class notes

Problem

A 3- ϕ load has a per-phase impedance, connected in Y, of $100 + j30 \Omega$. The line-to-line voltage magnitude at the load is 1500 V. The three-phase distribution line supplying this load has an impedance of $10 + j5 \Omega/\phi$.

- 1 Calculate the line-to-line voltage magnitude at the sending end of the distribution line.
- 2 Calculate real and reactive power supplied at sending end.
- 3 Calculate the power factor at the sending end.
- 4 Calculate the power factor at the receiving end.
- 5 Calculate the losses on the transmission line.
- 6 Perform a sanity check (compute power consumed by load).

Reading material

The material we covered today corresponds to:

- Module B3, pp. 7–21 of class notes
- Chapter 8, pp. 179–200 of textbook