Lecture 5

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- 3-Phase Transformer Bank
  - Consists of phases A, B, and C, each connected to a terminal, which outputs phase a, b, and c at a different voltage
  - Inside the "black box" there are transformers corresponding to each phase, but we are more interested in what occurs at the terminals
- With two buses injecting current towards each other, we may derive some equations:

$$\hat{z} = z\angle\theta_z$$
$$S_{12} = (V_1\angle\theta_1)(\hat{I}_{12}^*) \quad \text{and} \quad S_{21} = (V_2\angle\theta_2)(\hat{I}_{21}^*)$$

  - This gives us:

$$S_{12} = \frac{V_1^2}{z}e^{j\theta_z} - \frac{V_1V_2}{z}e^{j\theta_z}e^{j\theta_{12}}$$
$$S_{12} = C_1 - Be^{j\theta_{12}}$$
$$-S_{21} = -\frac{V_2^2}{z}e^{j\theta_z} + \frac{V_1V_2}{z}e^{j\theta_z}e^{-j\theta_{12}}$$
$$-S_{21} = C_2 + Be^{-j\theta_{12}}$$

  - These equations allow us to form "power circle" graphs to more easily demonstrate how power is delivered from one side of a transmission line to the other
  - Real power travels long distances better than reactive power