



Lecture 1



What is a Load Flow Study

- A load flow study is done on a power system to ensure that
 - Generation supplies the demand (load) plus losses.
 - Bus voltage magnitudes remain close to rated values
 - Generation operates within specified real and reactive power limits
 - Transmission lines and transformers are not overloaded.



A Load Flow Study Specifically Investigates the Following

- Busbar voltages
- Effect of rearranging circuits and incorporating new circuits on system loading.
- Effect of injecting in-phase and quadrature boost voltages on system loading.
- Optimum system running conditions and load distribution.
- Optimum system losses.
- Optimum rating and tap range of transformers.



The Load Flow Problem

- The starting point of a load flow problem is a single line diagram of the power system, from which input data for computer solutions can be obtained. Input data consist of bus data, transmission line data and transformer data.



The Load Flow Problem

- The following four variables are associated with each bus k - voltage magnitude V_k , phase angle δ_k , net real power P_k and reactive power Q_k supplied to the bus.



The Load Flow Problem

- Each bus k is categorized into one of the following bus types:
- **Swing bus** - There is only one swing bus which for convenience is normally numbered as bus 1, and is a reference bus for which V_1 and δ_1 are 1 and 0° respectively
- **Load Bus or PQ bus**- Most buses in a typical load flow program are load buses. P_k and Q_k are specified and the program computes V_k and δ_k .
- **Voltage Controlled bus or PV bus** - These are generally generator buses where P_k and V_k are specified and Q_k and δ_k are computed.