MW Flow Basics

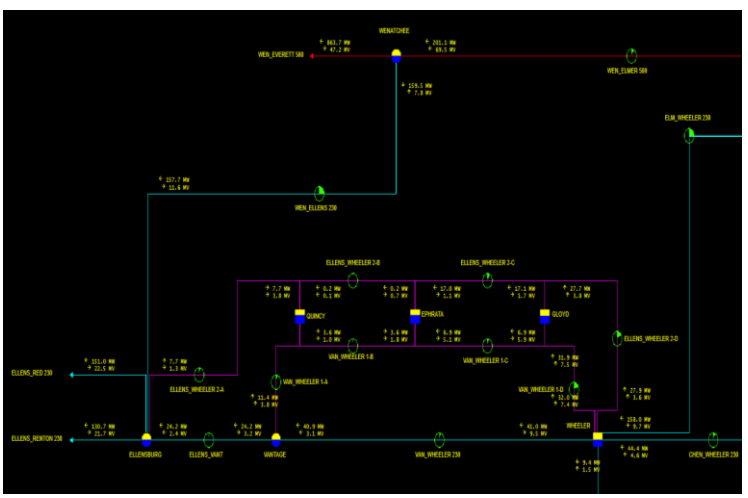
This is a computer-based training module which consists of a video lecture and three simulation exercises. Students watch a video lecture covering a series of topics related to the basics of megawatt flows, the principles of megawatt flow in AC networks, Kirchhoff's voltage and current laws, and Ohm's law, the impedance in series and in parallel and how it can be used to calculate phase angles. They will also learn how to calculate bus angle differences. Students will perform a series of simulated exercises related to Kirchhoff's Node Law, Kirchhoff's Loop Law and DC Load Flow Analogy.

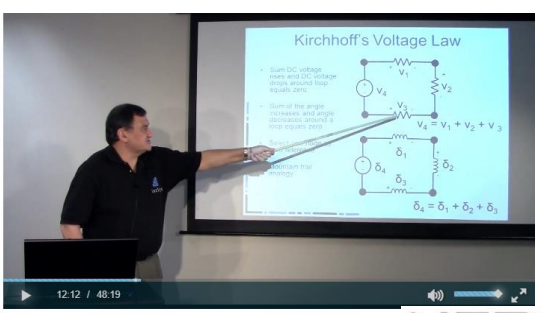
Cascadia 4020 Course Objectives

Megawatt Flow Basics

COURSE CE HOURS		
OT	STD	SIM
5	1.5	4

- Explain the principles of megawatt flow in AC networks.
- Define Kirchoff's voltage and current laws, and Ohm's law.
- Describe the characteristics of impedance in series and in parallel circuits.
- Calculate the effective impedance, phase angles and bus angle differences.
- Calculate line flow as angle difference increases across a line.
- Apply Kirchhoff's Node Law to a single bus structure to identify bad MW measurements.
- Apply Kirchhoff's Node law to sum the individual generators minus the individual loads within a station.
- Apply Kirchhoff's Node Law to sum the line flows into and out of a station to independently estimate the station net generation minus net load.
- Reconcile the two different estimates for station net generation minus net load to identify bad data.
- Confirm frozen measurements in the power system at a station without impacting system reliability or economy.
- Identify generator with the most leading angle for a normal and line outaged case.
- Identify load with the most lagging angle for a normal and line outaged case.
- Calculate angle difference across the system for a normal and line outaged case.
- Identify the element in the path that causes the largest phase angle difference for a normal and line outaged case.
- Evaluate impact of losing the element with the large phase angle difference for a normal and line outaged case.
- Correlate bus angle and MW flow measurements to demonstrate the rule that MWs flow down hill on angle differences for a normal and line outaged case.
- Observe the large standing phase angle for the case with the major line out of service.
- Apply Kirchhoff's loop law to verify that the sum of angle differences around a loop is zero.
- Employ the DC Load Flow analogy to estimate or confirm power flow through power system circuits.
- Adjust a phase shifter to detect frozen points in a 500-kV loop.
- Calculate line MW flow using per unit reactance values to estimate values that have been frozen and are incorrect.





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