

Goals

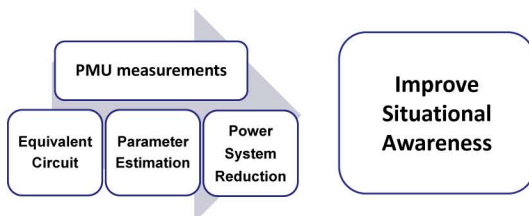
- Develop a framework for PMU measurements to enable collection of useful information in order to improve situational awareness
- Focus on how useful information can be extracted from PMU data, beyond direct display of the data
- Develop model validation approach to reduce discrepancy between simulated study and actual response
- Develop fast power system analysis method based on PMU measurements

Fundamental Questions/Challenges

- A key question is whether the PMU data help operators and engineers make better and more timely decisions
- Also, can the data give us sufficient comprehension of complex system behavior?
- What kinds of information can be obtained from PMU measurements? How can it be used to enhance power system operations?
 - Real-time event detection and security assessment
 - Dynamic reduction and system model validation
- How is it possible to obtain useful information from measurements at only a small percentage of system buses?

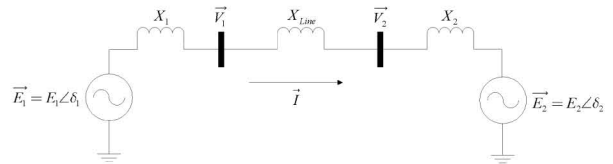
Research Plan

- Develop an approach to deriving an equivalent circuit of a synchronous generator from PMU measurements at the point of interconnection
- Develop an algorithm to obtain the equivalent circuit parameters and other model parameters
- Perform a feasibility study on whether the PMU data can be used to reduce large systems



Research Results

- Equivalent circuit derivation and its parameter estimation are done with a simple power system



Broader Impact

- Power system model validation for transient and small signal analysis
 - Identify model inadequacy by observing differences between simulation and actual response
- Fast dynamic simulation with reduced system models
 - Preserving most system modes in the area of interest
 - Coherency testing
 - Machine aggregation
 - Network reduction
- Online security assessment
 - Voltage and angle stability

Future Efforts

- Obtain actual power system PMU data and associated power flow models
- Test the developed method and algorithm with past or simulated cases for verification
- Integrate the developed algorithm into actual power system code
- Identify technology transfer targets through industry interactions; work to meet the possible targets' requirements

