EE8725

This 8000 course is an advanced graduate level course designed for MS and PhD students who are going to be developing advanced algorithms for power system analysis. The course is based primarily on Matlab programming and students taking EE8725 should have a good familiarity with Matlab programming and able to do homework problems and projects during the course that require Matlab programming. Students will be expected to select a project topic, research that topic, develop new Matlab code or take a piece of existing code and make it work and then turn in a report and make presentations of their projects to the class.

Topics for the 2015 class

1) Sparse Matrices

    - LDU Decomposition of matrices
    - Sparsity Programming
    - Optimal Ordering
    - Compensation, matrix inversion lemma, Sherman-Morrison Formula
    - Sparse Inverse
    - Sparse Vectors
    - Factorization Paths
    - Equivalent networks, adaptive matrix reduction
    - Partial Matrix refactorization
    - Error Analysis

2) Sparsity and Contingency Analysis
    - Dfactor Calculations
    - Adaptive Localization and partial factorization

3) Sparsity and Least Squares State Estimation Analysis
    - Observability algorithms
    - Orthogonal decomposition methods

4) Sparsity and Optimal Power Flow
    - Interior point algorithm
    - LPOPF

5) Integer Programming

6) Other advanced power systems algorithms

7) Projects: Each student in the class will be expected to research one topic and present it to the class. Topics from previous classes include:

    - Spanning Trees
    - Partial Matrix Refactorization
    - Sparsity and Parallel Processing
    - Sparsity and Optimal Power flow/Interior Point
    - Power Flow Using Adaptive Localization
    - Storage scheme for sparse matrices
    - Least Square Analysis/QR algorithm-optimal ordering
    - Matrix Compensation
    - Tellegen's Theorem
    - Sparse Vector Methods or Numerical Error Analysis/ ill conditioned matrices