

EE-472 Power System Analysis II

Project-1 & 2

Aim: Implement a function in MATLAB environment that can solve power flow problem using data from an input file in common data format (cdf). Your code should be capable of solving power flow problem for different systems (e.g. IEEE 30-bus system, IEEE 118-bus system, etc.)

- Use Newton-Raphson iteration for the solution of the problem.
- **DO NOT** use decoupled formulation.
- **DO NOT** ignore Q-limits of the generators.

BONUS: The fastest implementations will be awarded with Bonus points.

- First: 10 points
- Second: 7 points
- Third: 5 points

TASK-1: Submit the bus-admittance matrix. You must submit a report and your m-file. The report should **not** include explanation of your code; rather it should include the following

- a. Sparsity pattern plot of Y_{BUS} .
- b. Solution duration of the following equation, where I is the vector of bus injections and V is the vector of bus voltages.

$$I = Y_{BUS}V$$

Find solution by

- (i) taking the inverse of Y_{BUS} ,
- (ii) using the '`\`' comment.

I matrix should be formed using '`I=rand(300,I);`'.

- c. Number of elements used to store the same matrix as a 'sparse structure'.
You can form Y_{BUS_SPARSE} matrix using the 'sparse' comment.
- d. Comments on the results of part-a, b and c.

* All results should be based on the IEEE 300-bus system provided in the supplementary files.

- Submit your m-file via the ODTUClass link 'project_1_code'.

Submit your report via turnitin link provided in ODTUClass. At the end of your report provide your code as text.

TASK-2: You must submit a report and your m-file. The report should **not** include explanation of your code; rather it should include the following

- e. Any computational method you used to improve computational performance.
- f. Test results.
- g. Convergence threshold.
- h. Reasoning and comments about parts a, b and c.

* All results should be based on the IEEE 300-bus system provided in the supplementary files.

- You should write a MATLAB function, which takes some arguments as inputs and returns some results as output. Your function name should be in the following format:

e123456_surname_PF(argin1)

- Submit your m-file via the ODTUClass link 'project_2_code'.
- Submit your report via turnitin link provided in ODTUClass. At the end of your report provide your code as text.

Inputs: cdf file path

Outputs: Solution of the power flow (voltage magnitudes and phase angles), solution time, number of iterations.

Due date for Task-1: 25.3.2019

Due date for Task-2: 6.5.2019