

EE 574 Term Project Fall 2016

Objective: To implement WLS state estimator for the following relation between the measurements and system states.

$$z = h(x) + e$$

$$x = \begin{bmatrix} |V| \\ \theta \\ a \end{bmatrix}, \quad z = \begin{bmatrix} |V| \\ |I| \\ P_{inj} \\ P_{flow} \\ Q_{inj} \\ Q_{flow} \end{bmatrix}$$

z : Measurement vector (Mx1)

x : State vector ((2n-1)x1)

$h(\cdot)$: Non-linear relation between the states and the measurements.

E : Measurement error vector (Mx1)

$|V|$: Voltage magnitude

θ : Voltage phase angle

a : Tap ratio

$|I|$: Current magnitude

P_{inj} : Active power injection from a bus

P_{flow} : Active power flow on a branch

Q_{inj} : Reactive power injection from a bus

Q_{flow} : Reactive power flow on a branch

- ❖ Submit the conceptual design report via ODTUCLASS. The report should include flow charts and mathematical derivations. **(due: 26.11.2016)**
- ❖ Submit the implemented code and final report via ODTUCLASS. The report should include implementation details and test results. A test system (IEEE 30 bus test system) is provided (ieee_cdf.dat). The measurement set is also given (meas.dat). A “Discussion” section should be present in the report about the problems that you encounter during implementation and your observations. **(due: 8.1.2017)**

* Your code **MUST READ** parameter and topology data from ieee_cdf.dat and measurement data from meas.dat files. Do not copy and paste the data in your code.

* The implemented programs will be run with a different test system (different number of buses and branches) and measurement set (different number of measurements with different values, during evaluation of your report (same format different data). Therefore implement your code in a generic manner (it should run different input files with the same format/name).

BONUS:

- The fastest program will be awarded with extra 10 points.