sdmay19-46: Impact of High Photovoltaic Penetration on Distribution Systems

Advisor: Dr. Ajjarapu
Week 8 Report
October 24 - October 31

Team Members

Daniel Tott - Team Leader
Nathan McGlaughlin - Webmaster
Jasleen Grover - Key Concept Holder 1
Minsung Jang - Key Concept Holder 2

Summary of Progress this Report

Finished work on implementing IEEE's 13 node test feeder in GridLab in our file 13node.glm. Had a problem with the code for 13node.glm as the voltage regulator wasn't being allowed to make real-time changes with an incorrectly defined clock. Also added the previously defined voltage regulator for IEEE's 4 node test feeder to 4node.glm in GridLab. The voltage regulator ended up not working correctly, as the object for the regulator was not able to make adjustments with the clock being a snapshot of the 4 node system's power flow.

Past Week Accomplishments

Daniel:

- Defined the clock for 13node.glm
    - Created a clock similar to the one used in 4node.glm. This clock did not work correctly, as it needed to run at least 30 seconds to allow the voltage regulator to make adjustments.
- Defined the two modules for 13node.glm
    - The code for 13node.glm required only two modules: "powerflow" to run the power flow for the system, and "tape" to allow the voltages and currents to be extracted.
- Defined the two underground line conductors for 13node.glm
    - The system had two unique conductors that were needed to be defined, which needed to account for the neutral and shield.
- Defined all the transmission lines for 13node.glm
    - The distribution system needed for 11 line objects to be defined. There was also a split line that accounted for loads 632 and 671 being a distributed load.
- Added voltage regulator to 4node.glm
    - Made a definition for the voltage regulator that was previously used to solve a power flow for IEEE's 4 node test feeder. This regulator did not work correctly in the same way 13node.glm's didn't work, as the clock was only a snapshot of the power flow, and didn't allow the regulator to make the necessary adjustments.

Nathan:

- Defined the seven line spacings for 13node.glm
- Defined the three overhead line conductors for 13node.glm
- Defined Nodes 671, 675, 680, 684, and 692 for 13node.glm

Jasleen:
We started simulating the 13 bus IEEE system in GridLab D . We distributes the work amongst team members and the following was my assigned parts. The defining process involved a lot of learning and researching since coding in GridLab D is new for all of us.

- Defined the seven line configurations for 13node.glm
- Defined the transformer configuration for 13node.glm
- Defined the regulator configuration for 13node.glm
- Defined Nodes 645, 646, 650, and 652 for 13node.glm

Minsung:

- Defined the switch for 13node.glm
- Defined the transformer for 13node.glm
- Defined the regulator for 13node.glm
- Defined Nodes 611, 632, 633, and 634 for 13node.glm

Pending Issues

Daniel:

- Need to update the code for 13node.glm for the clock to allow the power flow to run for 60 seconds and give time for the voltage regulator to make adjustments.
- Need to update the code for 4node.glm for the clock to allow the power flow to run for long enough to give time for the voltage regulator to make adjustments.

Nathan:

- Need to correct 4 node with regulator code.

Jasleen:

- Need to correct the suggested configuration in the 13 node system (in my assigned part)

Minsung:

- Need to consider where should we add some nodes for better efficiency and correct assigned part in 13 node system.

Plans for Upcoming Reporting Period

Daniel:

- Update code for 13node.glm
    - The code for 13node.glm needs to be updated in order to allow the regulator to run long enough to make adjustments to the voltage levels of the system. The updated voltages and currents will then be compared to IEEE's values for the solution of the power flow.
- Update code for 4node.glm
    - The code for 4node.glm needs to be updated in order to allow the regulator to make the necessary adjustments that were found by hand in MATLAB. The voltages and currents that are extracted from GridLab-D will be compared to the findings that we found in MATLAB.

Nathan:

- Update code for 13node.glm

Jasleen:

After consulting with advisor and the TA I am planning on correcting the 13 bus system code and learn more about the Grid Lab D

Individual Contributions

Team Member	Contributions	Weekly Hours	Total Hours
Daniel Tott	-Defined the clock for 13node.glm -Defined the two modules for 13node.glm -Defined the two underground line conductors for 13node.glm -Defined all the transmission lines for 13node.glm	8	63
Nathan McGlaughlin	-Defined the seven line spacings for 13node.glm -Defined the three overhead line conductors for 13node.glm -Defined Nodes 671, 675, 680, 684, and 692 for 13node.glm	8	59
Jasleen Grover	-Defined the seven line configurations for 13node.glm -Defined the transformer configuration for 13node.glm -Defined the regulator configuration for 13node.glm -Defined Nodes 645, 646, 650, and 652 for 13node.glm	8	59

Minsung Jang	- Defined the switch for 13node.glm - Defined the transformer for 13node.glm - Defined the regulator for 13node.glm - Defined Nodes 611, 632, 633, and 634 for 13node.glm	8	52

Gitlab Activity Summary

Gitlab Report

- Defined the clock, two modules, two underground line conductors, transmission lines, and voltage regulator for 13node.glm - Daniel