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Milestone 4

Repository

Link: https://github.com/griffincj/Power-System-Analysis

Overview

This milestone adds the ability to conduct a fault study in addition to the power flow study that was implemented for milestone 3. A command line text interface is presented to the user upon startup that allows selection between the two study types.

The fault study calculates a z-bus from the inverse of the y-bus, while also including the positive sequence reactance from the two generators. The vector of post-fault voltages, as well as the faulted bus's current is output from the program.

Main Module

The output required for this module can be displayed by running the main method of the main.py module. The main module now offers a selection between running a fault study and a power flow study. Upon selecting the fault study option, the user will also be prompted to enter the bus to fault and the pre-fault voltage.
After the study is run, the user will be prompted to prompted to select another study to be performed and will continue to be prompted until the program is exited. This is for ease of use for the user.

PowerSystem

The power system class has been extended to add several new methods for solving the power flow problem.

Methods

- **Calc_z_bus(self)**
  - Starts by calculating the y-bus and then adding the positive sequence reactance for each generator to the y-bus. The y-bus is then inverted, which returns the **z-bus**
- **Calc_fault(self, selected_bus, pre_fault_v)**
  - The fault current is calculated from the pre-fault voltage phasor and the z-bus value at the diagonal for the faulted bus. The i_vector is all zeroes, except for the faulted bus

- The voltage vector is calculated by multiplying the z-bus and the i_vector. For the final voltage vector, the calculated voltage is subtracted from the pre-fault voltage.