**IEEE 13 Bus system in Simulink**

* Lines are modelled as Three Phase and Single Phase Pi Section Line
* Voltage regulators are modelled and includes LDC
* Runs in discrete domain with Ts=50 µsec
* Initial Tap settings are taken same as the benchmark document

**Regulator Taps and Parameters**

|  |  |  |  |
| --- | --- | --- | --- |
| Regulator ID: | 1 |  |  |
| Line Segment: | 650 - 632 |  |  |
| Phases: | A - B -C |  |  |
| Connection: | 3-Ph,LG |  |  |
| Monitoring Phase: | A-B-C |  |  |
| Bandwidth: | 2.0 volts |  |  |
| PT Ratio: | 20 |  |  |
| Primary CT Rating: | 700 |  |  |
| Compensator Settings: | Ph-A | Ph-B | Ph-C |
| R - Setting: | 3 | 3 | 3 |
| X - Setting: | 9 | 9 | 9 |
| Voltage Level (Vref): | 122 | 122 | 122 |

**Comparison of Steady state voltages and Substation Power**

|  |  |  |  |
| --- | --- | --- | --- |
| **Substation Active Power (KW)** | **Phase a** | **Phase b** | **Phase c** |
| Benchmark | 1251.398 | 977.332 | 1348.461 |
| Simulink | 1238 | 1019 | 1327 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Substation Reactive Power (KVar)** | **Phase a** | **Phase b** | **Phase c** |
| Benchmark | 681.570 | 373.418 | 669.784 |
| Simulink | 678.6 | 404 | 663.5 |

|  |  |
| --- | --- |
| **Tap Setting** | **Regulator 1** |
| Benchmark | 10 8 11 |
| Simulink(Initial) | 10 8 11 |
| Simulink(Final) | 10 8 10 |

**Phase A Voltage**

****

**Phase B Voltage**

****

**Phase C Voltage**

****

**% Error Voltage**

****

|  |  |  |  |
| --- | --- | --- | --- |
| **Max Error pu** | **Phase a** | **Phase b** | **Phase c** |
|  | 0.0060 | 0.0097 | 0.0033 |

The main reason for the difference in voltage compared to benchmark is due to the assumptions and approximations taken as given below

* Distribution Lines modeled as Pi-Section which assumes a balanced line.
* Dynamic Simulation in Simulink will consider all Loads as Constant Impedance Loads