

Title: Modelling and simulation of IEEE118 bus system using OpenIPSL

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Abstract:

The IEEE 118 shall be used to study the voltage stability of the buses during different conditions. The bus system consists of 54 generators, 118 buses, 99 loads, 186 branches and 9 transformers. The system has a base of 100MVA. The Submitted model is implemented in OpenModelica using OpenIPSL Library. The Figure:1 shows the model which is being implemented in OpenModelica. A balanced three phase fault is simulated for about 0.4 seconds in the bus 71 and the output waveforms are being observed.

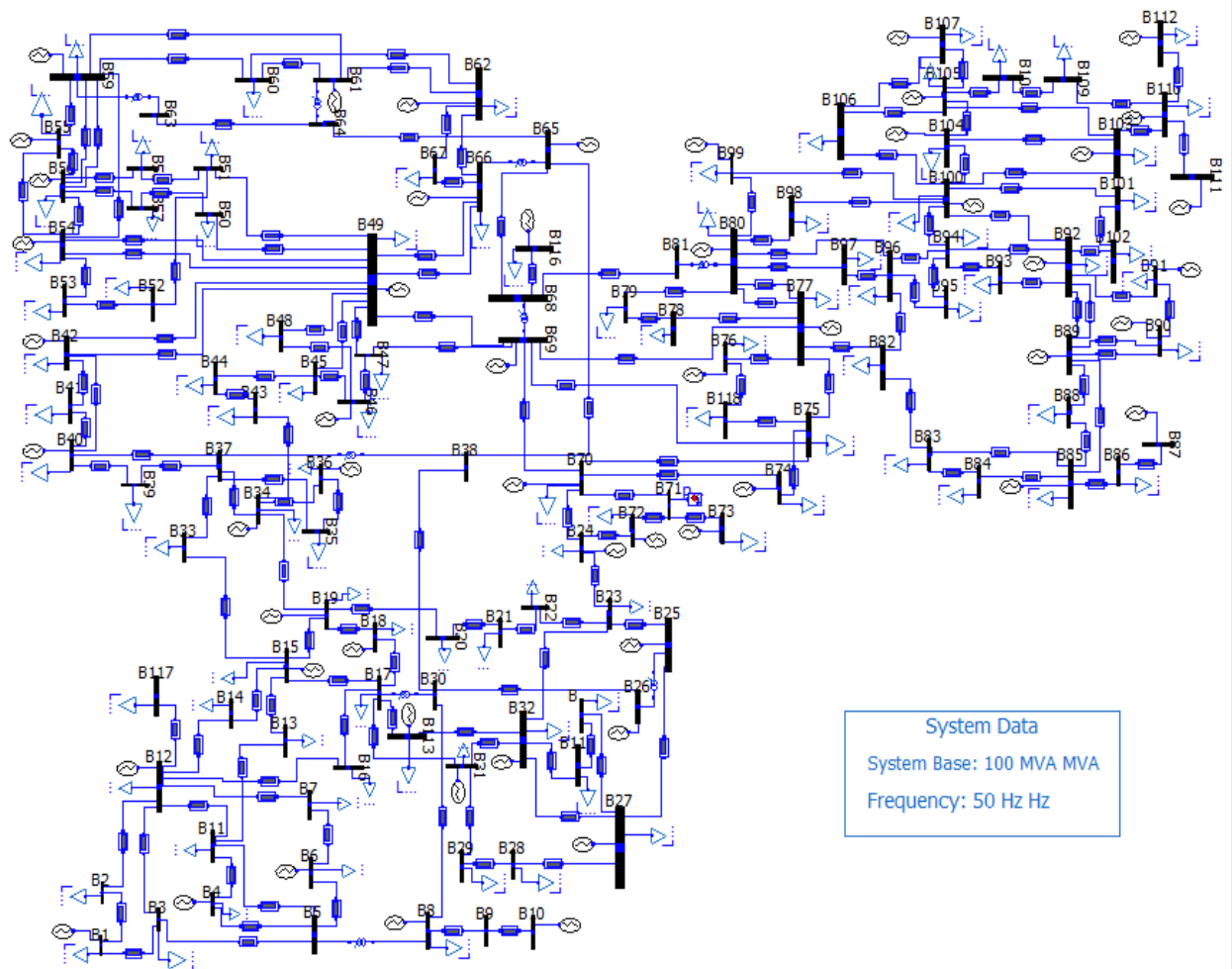


Fig: 1 Modelling of IEEE 118 bus system in Openmodelica using OpenIPSL

Explanation:

The model uses the following components

Component Name	Class Path	Number
Two Winding Transformer	OpenIPSL.Electrical.Branches.PSAT.TwoWindingTransformer	9
Buses	OpenIPSL.Electrical.Buses.Bus	118
Constant PQ Load	OpenIPSL.Electrical.Loads.PSAT.LOADPQ	99
Generators	OpenIPSL.Electrical.Machines.PSSE.GENROU	54
PwLine	OpenIPSL.Electrical.Branches.PwLine	186
Three phase Fault	OpenIPSL.Electrical.Events.PwFault	1
Sysdata block	OpenIPSL.Electrical.SystemBase	1

Table 1: Components used in Modelling

The IEEE 118 bus test system is being implemented in OpenModelica using OpenIPSL Library. The system has a base of 100MVA. The type of generators used in the simulation is of round rotor type (GENROU). The system is being simulated for a total time period of 10 seconds. The transformers are being added between the buses where the base voltages of the buses are different. A balanced three phase fault is being simulated at bus 71 for a time period of 0.4 seconds. The voltage profiles of all the buses during the fault are being observed. The voltage of the buses after the fault become stable after a few seconds since the Automatic Voltage Control is not used. During the fault, we can observe from the bus voltage profiles, that the voltage dip is more for the 71st bus as it is the fault bus and the severity of the fault is decreased as we move away from the fault bus. The voltages of all the buses are found to be between 0.9 and 1.1p.u. Simulation obtained shows profiles at various buses and waveforms obtained are observed.

The Figure 2 shows the voltage profiles of the buses of the IEEE118 bus system during the fault conditions.

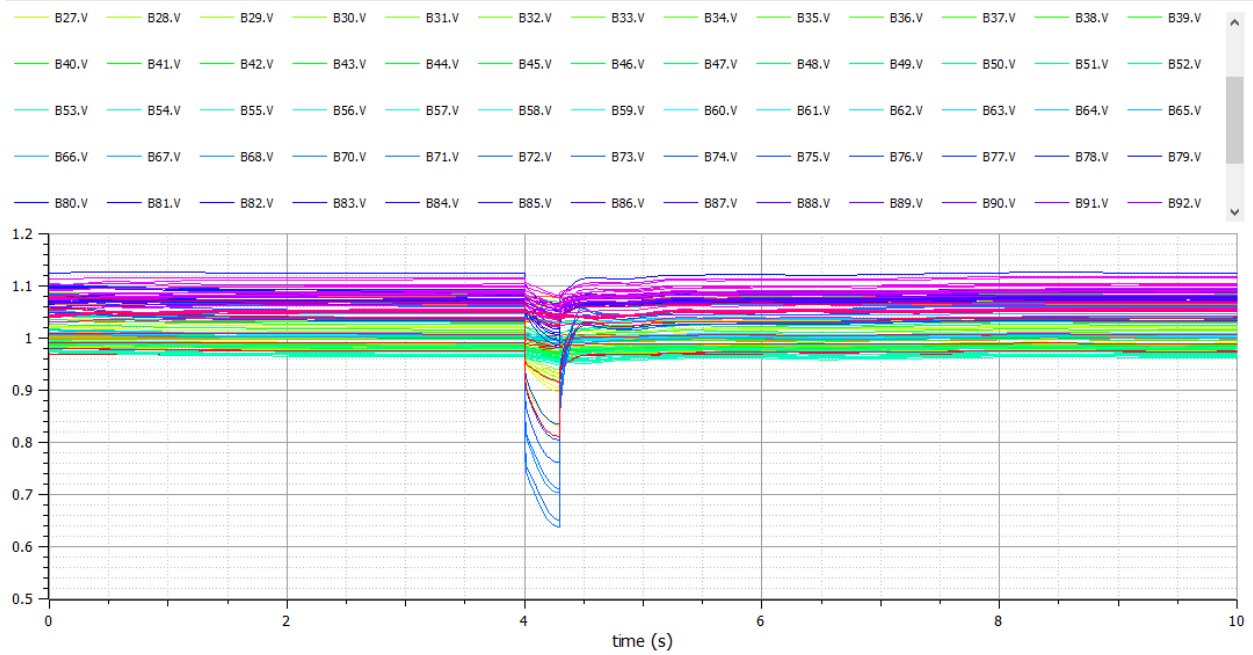


Fig 2: Voltage profiles of all the buses during fault

Conclusion:

The implemented IEEE 118 bus model in Modelica represents the system behaviour before and after the fault occurs at the bus 71. Bus voltage magnitude (p.u.) of all 118 buses obtained are found to be between 0.9 p.u and 1.1 p.u. The relation between line impedance and fault severity is also observed.