

## Title: Modelling and Simulation of 11 Bus and 3 Generator using the OpenIPSL

Name of the Contributor: Avantika Srivastava

Email ID: [avantikasrivastava1111@gmail.com](mailto:avantikasrivastava1111@gmail.com)

Institution: R. R. Institute of Modern Technology, Lucknow

**Abstract :** The Power System network of an Electric Company consists of 11 Buses ,3 Generators and 5 P-Q Loads. In this proposal we observe the voltage profiles of 11 Buses under Fault Condition. The 11 Bus 3 Generator System was designed by using OpenIPSL. The 11 Buses and 3 Generators System was designed by using OpenModelica and OpenIPSL. The power system model consists of 3 generators 11 buses, 5 loads, and 14 lines. The system is on a 100 MVA base. The model submitted is implemented in Modelica language using OpenIPSL package shown in Figure 1. A fault simulated at Bus 8 for the duration of 0.4 seconds (2.5 seconds to 2.9 seconds), the simulated voltage profiles of 11 Bus System at various buses shown in Figure 2. For all analysis of this system, the lower voltage magnitude limits at all buses are 0.9 p.u and upper limits are 1.1 p.u. Simulation obtained shows voltage profiles at various buses.

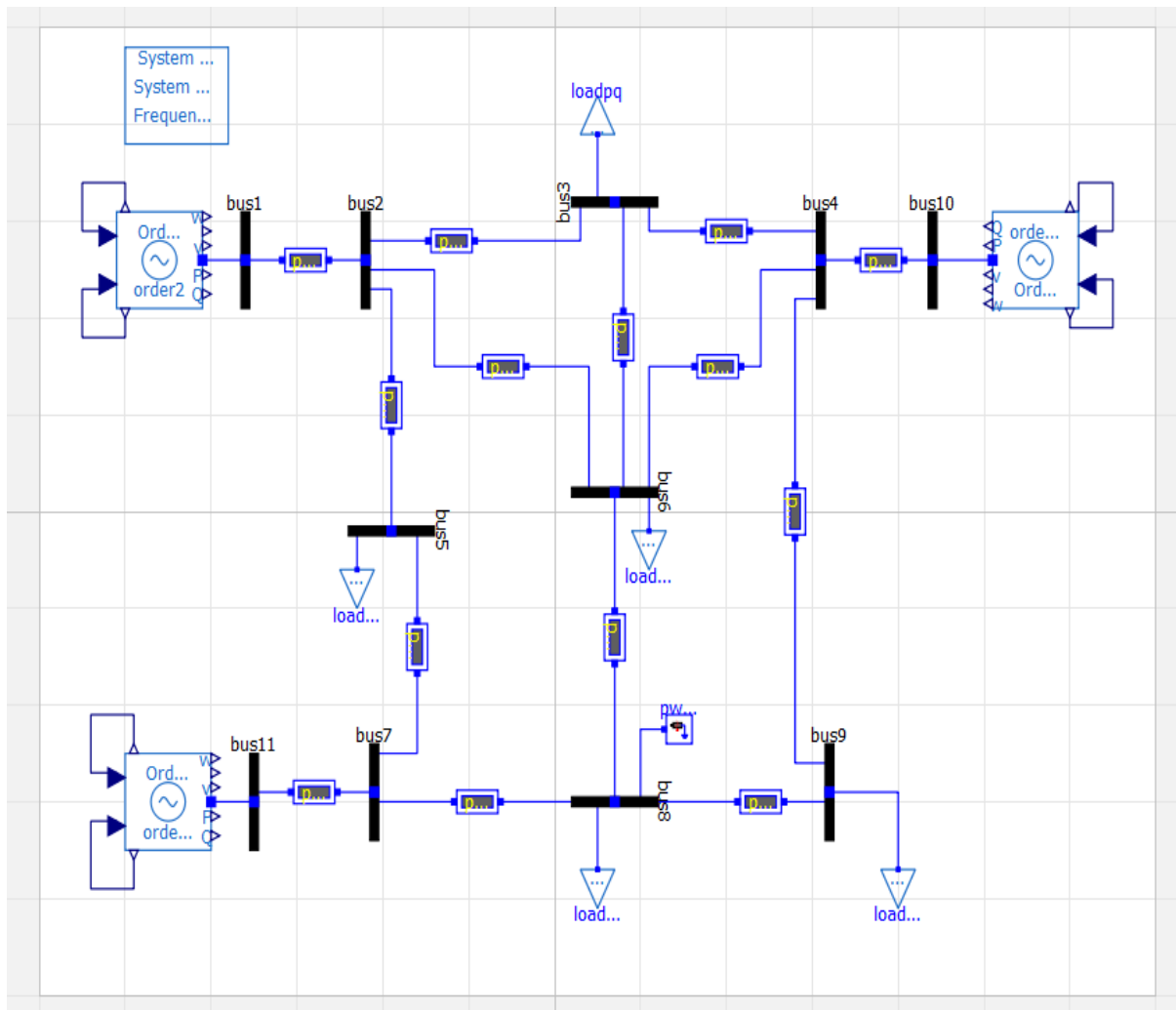


Figure 1. Implementation of 11 bus and 3 Generator System using the OpenIPSL

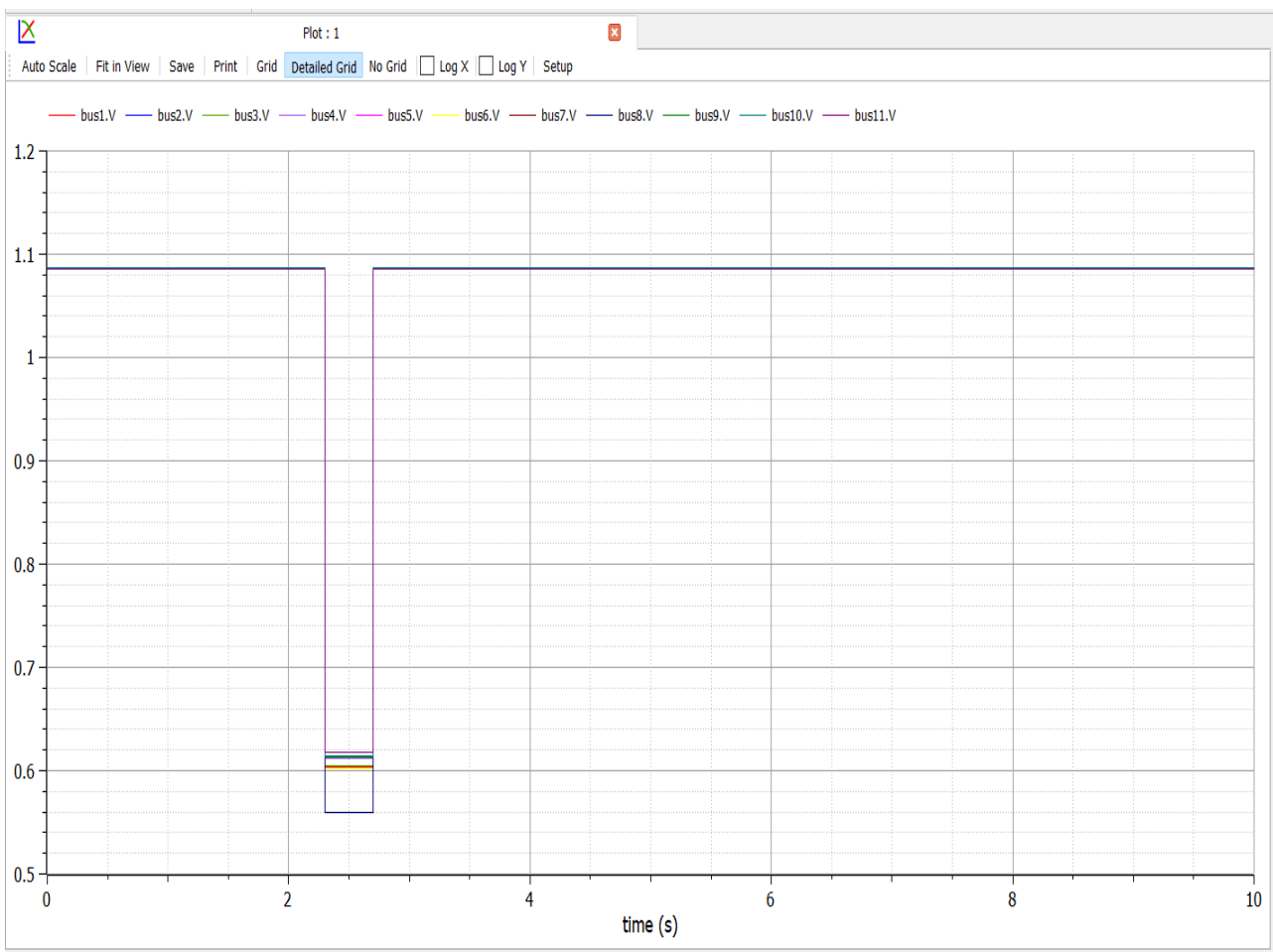
**Description of the simulation:**

**Table 1: Model components:**

Component Name	Path	Number
Bus	OpenIPSL.Electrical.Buses.Bus	11
Power Line	OpenIPSL.Electrical.Branches.PwLine	14
Generator	OpenIPSL.Electrical.Machines.PSAT.Order2	03
Constant PQ Load	OpenIPSL.Electrical.Loads.PSAT.LOADPQ	05
System Data Block	OpenIPSL.Electrical.SystemBase	01
Three phase Fault	OpenIPSL.Electrical.Events.PwFault	01

The 11 bus and 3 Generator network model is implemented in OpenModelica language using OpenIPSL package is to study the voltage stability at different buses. The system is on a 100 MVA base, the system voltage level is 11KV.

The simulation result of the Bus voltages of 11 bus and 3 Generator shown below:



**Figure 2. Voltage profiles of buses of 11 bus and 3 Generator System**

**Table 2: Bus voltage magnitude (p.u.) of all buses obtained are tabulated below.**

<b>Bus Number</b>	<b>kV(p.u)</b>
1	1.04
2	1.02
3	0.99
4	1.02
5	1.01
6	0.99
7	1.02
8	0.98
9	0.98
10	1.03
11	1.03

**Conclusion:**

The Implementation of 11 bus and 3 Generator System in Modelica represents the system behaviour before and after the fault occurs at the bus 8. Bus voltage magnitude (p.u.) of all 11 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.