Title: **Modelling of 22 Bus Distribution System using the Open IPSL**

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Abstract: The 22 Bus Distribution System shall be used a small portion of agricultural distribution of Eastern Power Distribution system in India having base voltage as 11 kV. The 22 Bus Distribution System was designed by using Open IPSL.The power system model consists of 1 generator1, 22 buses, 21 loads, and 21 lines. The system is on a 10 MVA base. The model submitted is implemented in Modelica language using OpenIPSL package shown in Figure 1. A fault simulated at Bus 11 for the duration of 0.4 seconds (2.5 seconds to 2.9 seconds), the simulated voltage profiles of 22 Bus Distribution 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.

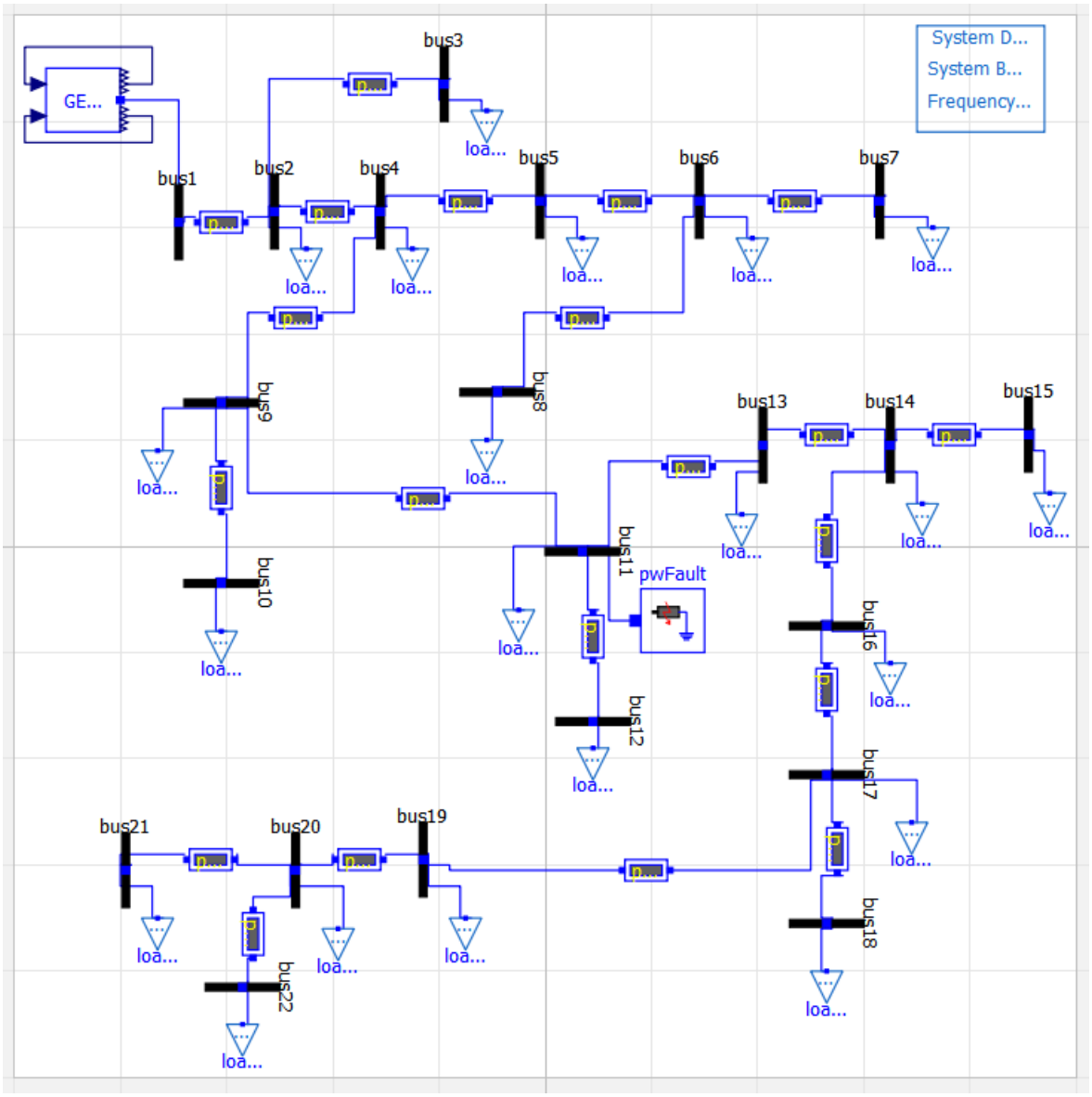

Figure 1. Implementation of 22 Bus Distribution System

Description of the simulation:

Table 1: Model components:

Component Name	Path	Number
Bus	OpenIPSL.Electrical.Buses.Bus	22
Power Line	OpenIPSL.Electrical.Branches.PwLine	21
Generator	OpenIPSL.Electrical.Machines.PSE.GENROU	01
Constant PQ Load	OpenIPSL.Electrical.Loads.PSAT.LOADPQ	21
System Data Block	OpenIPSL.Electrical.SystemBase	01
Three phase Fault	OpenIPSL.Electrical.Events.PwFault	01

The 22 Bus Distribution System network model is implemented in OpenModelica language using OpenIPSL package is to study the voltage stability at different buses. The system is on a 10 MVA base, the system voltage level is 11KV.

The simulation result of the Bus voltages of 22 Bus Distribution System network shown below:

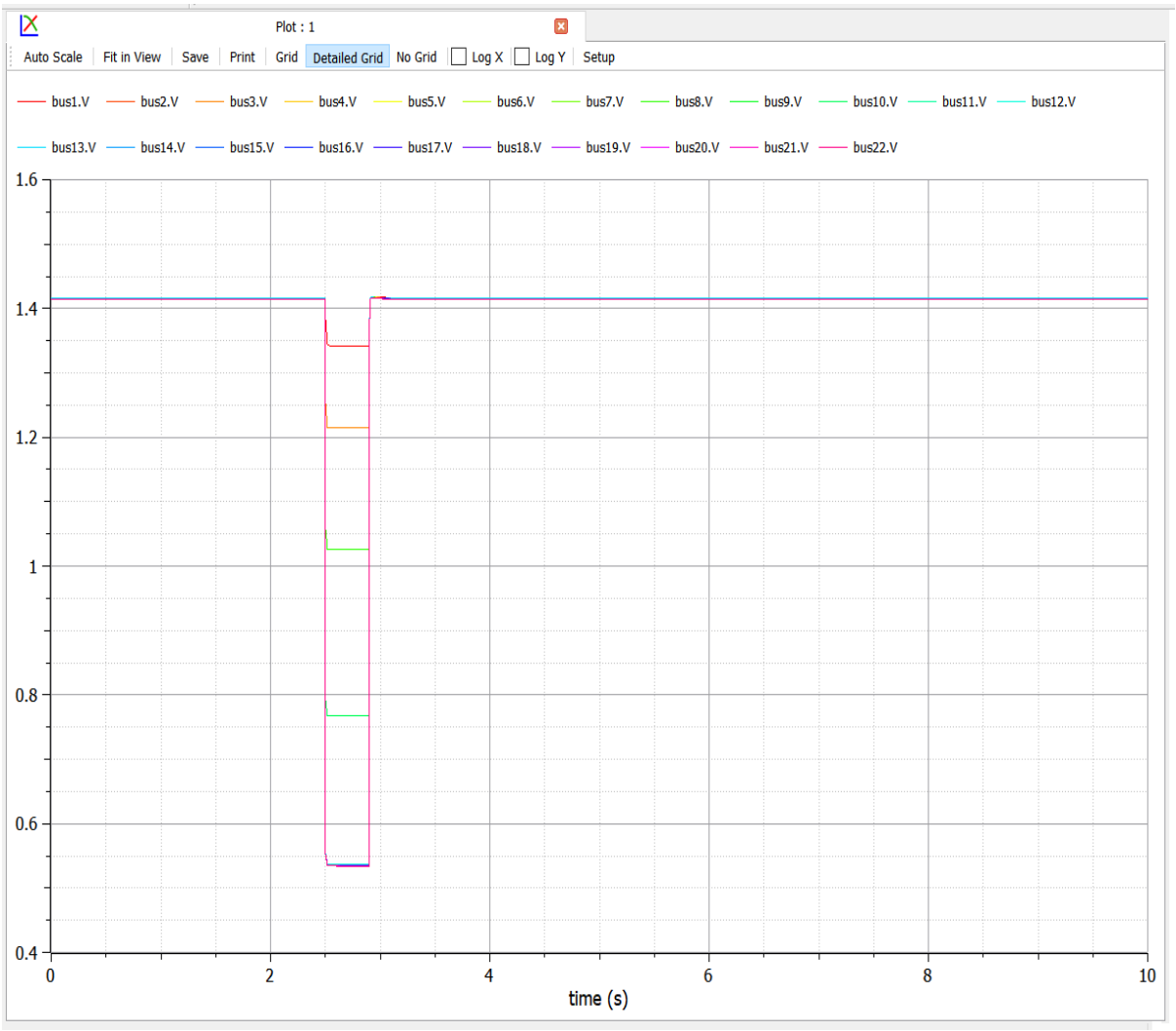

Figure 2. Voltage profiles of buses of 22 Bus Distribution System

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

Bus Number	kV(p.u)
1	1
2	0.997
3	0.997
4	0.993
5	0.992
6	0.992
7	0.992
8	0.992
9	0.987
10	0.987
11	0.983
12	0.983
13	0.981
14	0.976
15	0.976
16	0.975
17	0.974
18	0.974
19	0.973
20	0.973
21	0.973
22	0.973

Conclusion:

The Implementation of 22 Bus Distribution System in Modelica represents the system behaviour before and after the fault occurs at the bus 11. Bus voltage magnitude (p.u.) of all 22 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.