

Title: **Modelling of 18 Bus Distribution System with Linear Loads using the OpenIPSL**

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Abstract The 18 Bus Distribution System shall be used for voltage harmonics on a power system Can be minimized by using active filters to inject distortion-cancelling currents on non-linear loads. In this proposal we observe the voltage profiles of 18 Bus Distribution System with linear loads. The 18 Bus Distribution System was designed by using OpenIPSL. The power system model consists of 1 generator, 18 buses, 15 loads, and 17 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 14 for the duration of 0.4 seconds (2.5 seconds to 2.9 seconds), the simulated voltage profiles of 18 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.

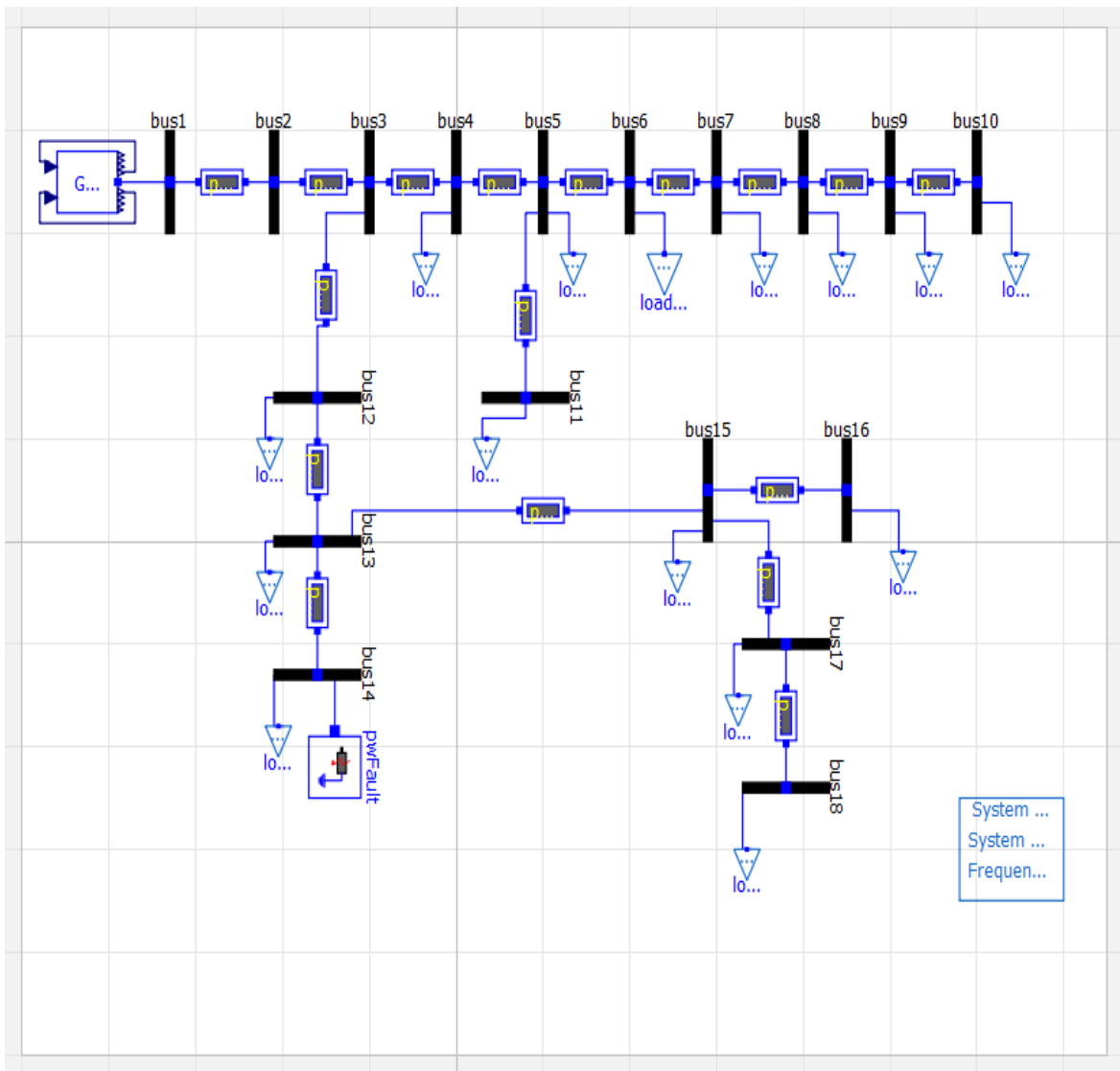


Figure 1. Implementation of 18 Bus Distribution System with Linear Loads

Description of the simulation:

Table 1: Model components:

Component Name	Path	Number
Bus	OpenIPSL.Electrical.Buses.Bus	18
Power Line	OpenIPSL.Electrical.Branches.PwLine	17
Generator	OpenIPSL.Electrical.Machines.PSE.GENROU	01
Constant PQ Load	OpenIPSL.Electrical.Loads.PSAT.LOADPQ	15
System Data Block	OpenIPSL.Electrical.SystemBase	01
Three phase Fault	OpenIPSL.Electrical.Events.PwFault	01

The 18 Bus Distribution System with Linear Loads 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 12.5KV.

The simulation result of the Bus voltages of 18 Bus Distribution System with Linear Loads network shown below:

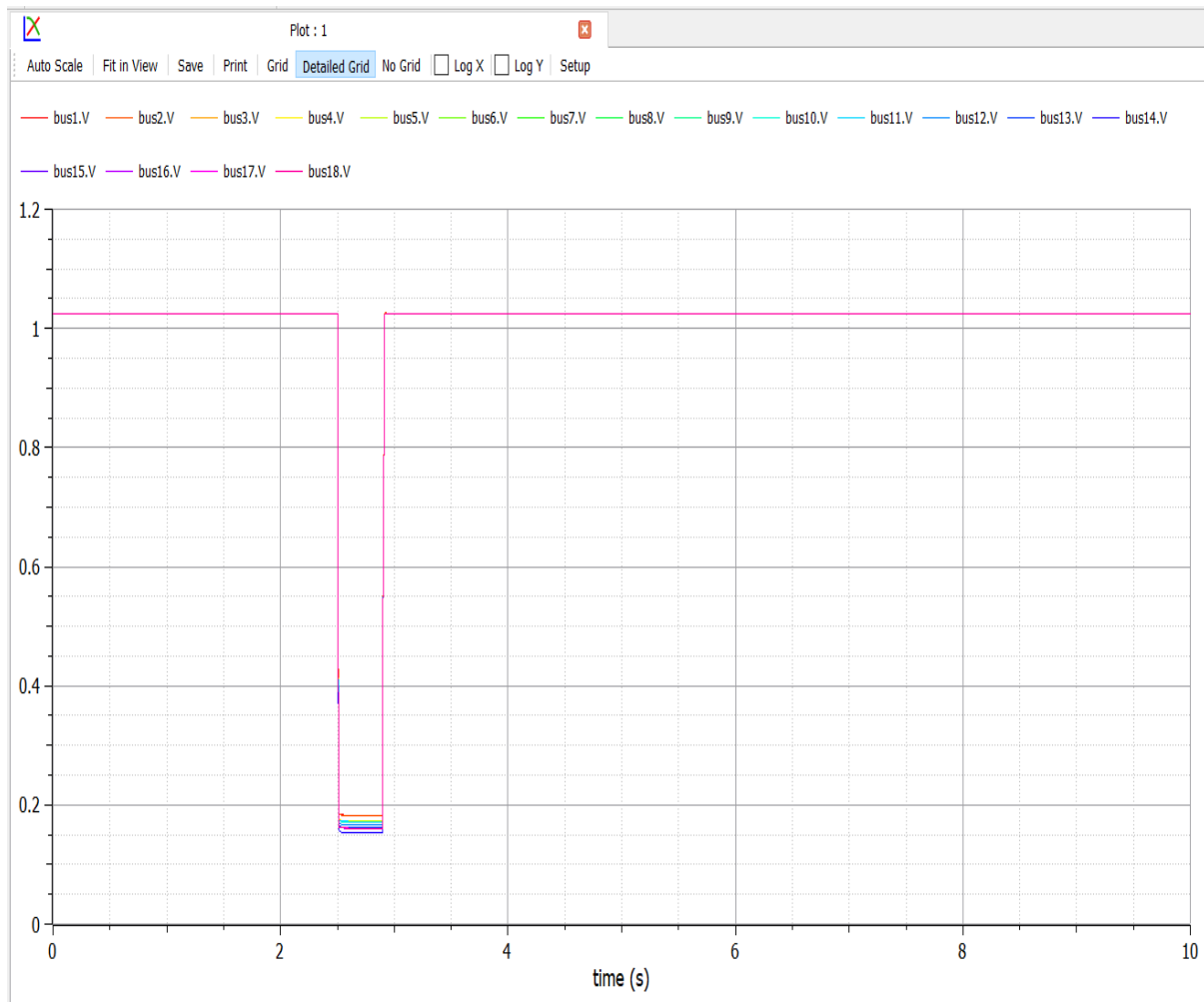


Figure 2. Voltage profiles of buses of 18 Bus Distribution System with Linear Loads

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

Bus Number	kV(p.u)
1	1.05
2	1.05
3	1.055
4	1.051
5	1.046
6	1.043
7	1.036
8	1.035
9	1.033
10	1.027
11	1.05
12	1.05
13	1.05
14	1.048
15	1.045
16	1.049
17	1.042
18	1.042

Conclusion:

The Implementation of 18 Bus Distribution System with Linear Loads in Modelica represents the system behaviour before and after the fault occurs at the bus 14. Bus voltage magnitude (p.u.) of all 18 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.