

## Title: Modelling of 17 Bus Distribution System By using the OpenIPSL

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**Abstract** The 17 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 17 Bus Distribution System with linear loads. The 17 Bus Distribution System was designed by using OpenModelica and OpenIPSL..The power system model consists of 1 generator, 17 buses, 12 loads, and 16 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 7 for the duration of 0.4 seconds (2.5 seconds to 2.9 seconds), the simulated voltage profiles of 17 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.

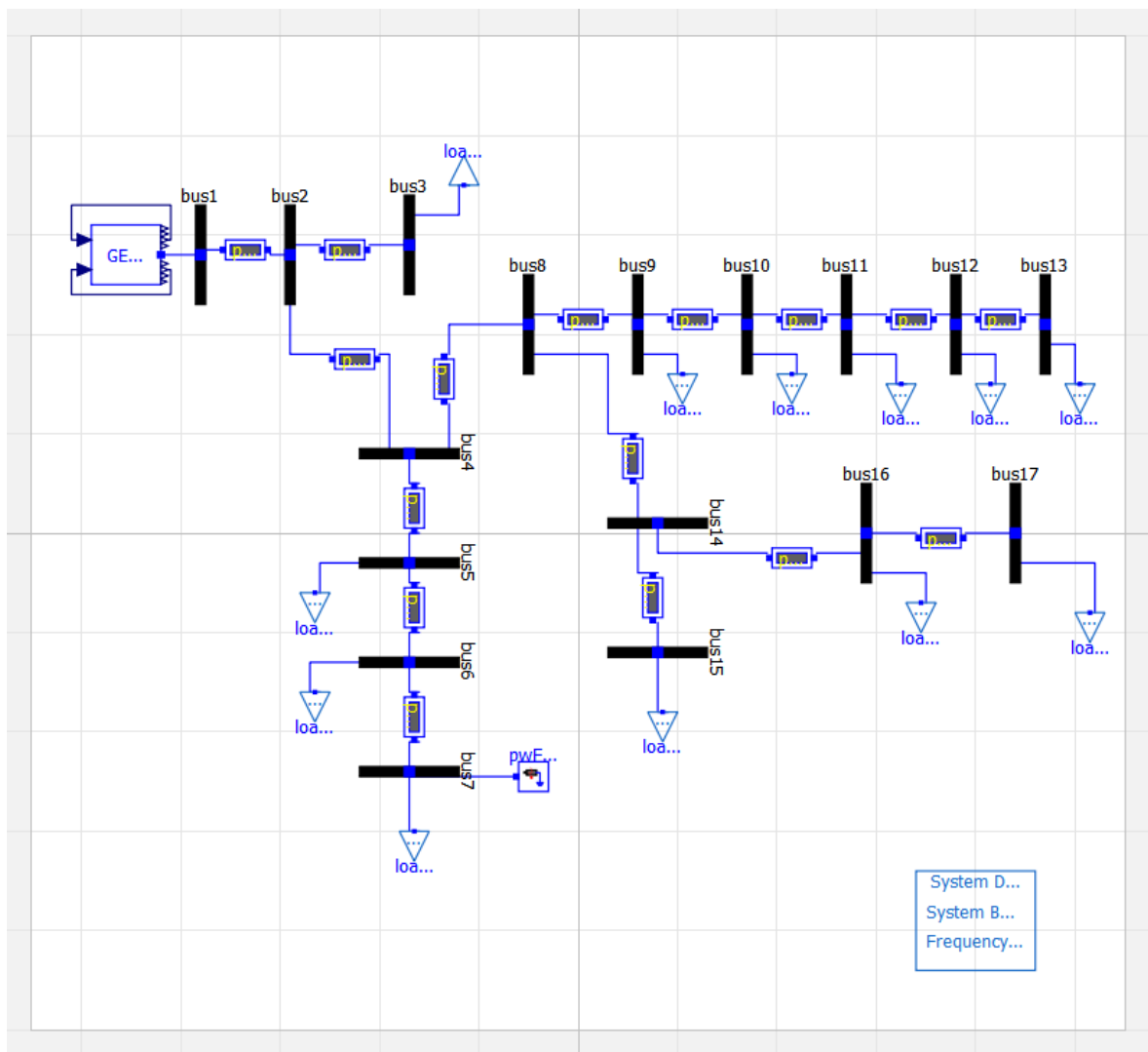


Figure 1. Implementation of 17 Bus Distribution System by Using OpenIPSL

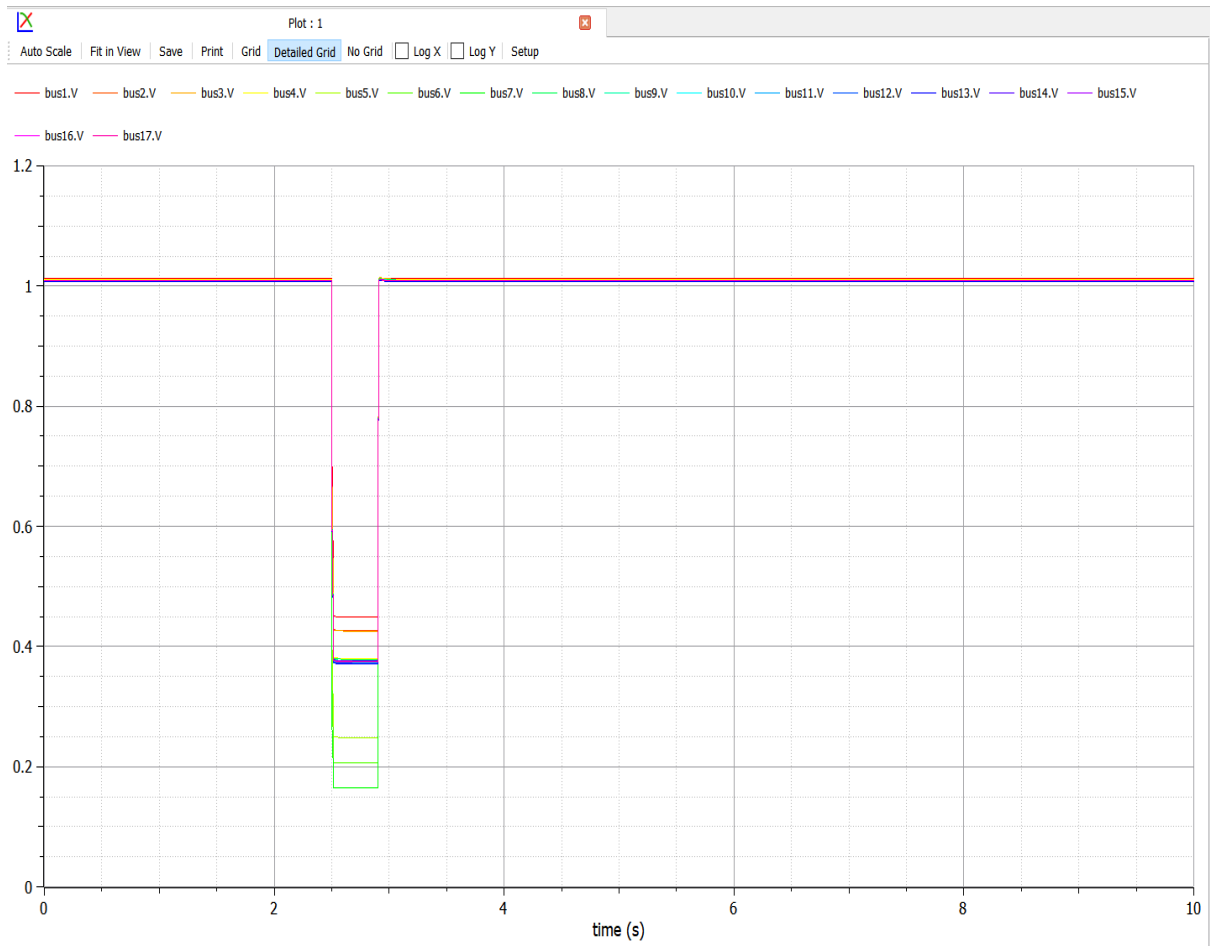
**Description of the simulation:**

**Table 1: Model components:**

Component Name	Path	Number
Bus	OpenIPSL.Electrical.Buses.Bus	17
Power Line	OpenIPSL.Electrical.Branches.PwLine	16
Generator	OpenIPSL.Electrical.Machines.PSE.GENROU	01
Constant PQ Load	OpenIPSL.Electrical.Loads.PSAT.LOADPQ	12
System Data Block	OpenIPSL.Electrical.SystemBase	01
Three phase Fault	OpenIPSL.Electrical.Events.PwFault	01

The 17 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 11KV.

The simulation result of the Bus voltages of 17 Bus Distribution System with Linear Loads network shown below:



**Figure 2. Voltage profiles of buses of 17 Bus Distribution System with Linear Loads**

**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
2	0.9967
3	0.9959
4	0.9752
5	0.9752
6	0.9742
7	0.9736
8	0.9917
9	0.9855
10	0.9794
11	0.9749
12	0.9712
13	0.9691
14	0.9859
15	0.9841
16	0.9803
17	0.9797

**Conclusion:**

The Implementation of 17 Bus Distribution System with Linear Loads in Modelica represents the system behaviour before and after the fault occurs at the bus 7. Bus voltage magnitude (p.u.) of all 17 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.