PLECS

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Developer(s)	Plexim
Initial release	2002; 18 years ago
Operating system	Mac OS X, Windows, Linux
Platform	Standalone or Simulink
Available in	English, Japanese
Type	Simulation software
License	Proprietary
Website	www.plexim.com/products/

PLECS (Piecewise Linear Electrical Circuit Simulation) is a software tool for system-level simulations of electrical circuits developed by Plexim.[1] It is especially designed for power electronics but can be used for any electrical network.

Contents

- 1 Integration with MATLAB/Simulink or standalone
  - 1.1 Standalone version
- 2 Semiconductors modeled as ideal switches
- 3 References
- 4 External links

Integration with MATLAB/Simulink or standalone

The program Simulink is ideally suited for the simulation of controls. Therefore, Simulink is also a convenient tool for the design of closed loop controlled electrical systems. PLECS enhances Simulink with the capability to simulate electrical circuits directly. The user can simply enter a circuit as a schematic of electrical components. At Simulink block level the circuit is represented as a subsystem, so the user can build controls and other non-electrical elements around it and take full advantage of the Simulink environment and its toolboxes.

The concept of integration into Simulink has the advantage that only the part of the system in which electrical units are of interest needs to be modeled as an electrical circuit. The simulation of all non-electrical parts such as controls and mechanics should be done in Simulink.[2]

MATLAB can be employed to compute circuit parameters and to post process and visualize the simulation results.

Standalone version

There is also a standalone version of PLECS that allows simulation of electrical circuits and control systems directly within the PLECS package. The standalone version uses GNU Octave as its numerical engine in place of MATLAB.

Semiconductors modeled as ideal switches

Most circuit simulation programs model switches as highly nonlinear elements. Due to steep voltage and current transients, the simulation becomes slow when switches are toggled. In the most simple case a switch is modeled as a variable resistance that changes between a very small and a very large value. In other cases, it is represented by a sophisticated semiconductor model.

When simulating complex power electronic systems, however, the processes during switching are of little interest. Here, it is more appropriate to use ideal switches that toggle instantaneously between a closed and an open circuit. This approach, which is implemented in PLECS, has two major advantages: Firstly, it yields systems that are piecewise-linear across switching instants, (thus resolving the otherwise difficult problem of simulating the non-linear discontinuity that occurs in the equivalent-circuit at the switching instant). Secondly, to handle discontinuities at the switching instants, only two integration steps are required (one for before the instant, and one after). Both of these advantages speed up the simulation considerably.