Release Notes for SimElectronics®

How to Contact MathWorks

`www.mathworks.com`	Web
`comp.soft-sys.matlab`	Newsgroup
`www.mathworks.com/contact_TS.html`	Technical Support
`suggest@mathworks.com`	Product enhancement suggestions
`bugs@mathworks.com`	Bug reports
`doc@mathworks.com`	Documentation error reports
`service@mathworks.com`	Order status, license renewals, passcodes
`info@mathworks.com`	Sales, pricing, and general information

508-647-7000 (Phone)

508-647-7001 (Fax)

The MathWorks, Inc.
3 Apple Hill Drive
Natick, MA 01760-2098

For contact information about worldwide offices, see the MathWorks Web site.

Release Notes for SimElectronics®

Contents

R2012b

R2012a

R2011b

R2011a

R2010b

R2010a

R2009b

R2009a

R2008b

R2008a+

R2012b

Version: 2.2
New Features: Yes
Bug Fixes: No

Single-pole and double-pole switch blocks

The Passive Devices library now contains a sublibrary, named Switches, with four new blocks:

- The DPDT Switch block models a double-pole double-throw switch.
- The DPST Switch block models a double-pole single-throw switch.
- The SPDT Switch block models a single-pole double-throw switch.
- The SPST Switch block models a single-pole single-throw switch.

For each switch type, you have an option of modeling turn-on and turn-off delays, that is, a delay between the point at which the voltage at the control port passes the threshold and the point at which the switch opens or closes.

Five new sensor blocks: PTC Thermistor, Pressure Transducer, Resolver, Gyro, and Accelerometer

Five new blocks have been added to the Sensors library:

- The Accelerometer block provides an abstract model of a MEMS accelerometer. The acceleration at the mechanical translational port is mapped to either a voltage level or the duty cycle of a PWM voltage across the electrical + and - ports. The output voltage is limited according to the values that you provide for maximum and minimum output voltage. Optionally, you can model sensor dynamics by adding a first-order lag between the angular rate at the mechanical port and the corresponding voltage applied to the electrical + and - ports.
- The Gyro block provides an abstract model of a MEMS gyroscope. The gyro provides an output voltage that is proportional to the angular rotation rate presented at the mechanical rotational port. The output voltage is limited according to the values that you provide for maximum and minimum output voltage. Optionally, you can model sensor dynamics by adding a first-order lag between the angular rate at the mechanical port and the corresponding voltage applied to the electrical + and - ports.
- The PTC Thermistor block models a switching type positive temperature coefficient (PTC) thermistor. This type of thermistor has a decreasing resistance with increasing temperature, up to the Curie temperature. Above the Curie temperature, the resistance increases very rapidly with increasing temperature. To represent a non-switching linear PTC thermistor, use the Thermal Resistor block.
- The Pressure Transducer block models a generic pressure transducer that turns a pressure measurement into a voltage. The output voltage is linearly proportional to the pressure. If the pressure is less than zero, the block outputs zero volts. An input pressure equal to the **Pressure range** parameter value results in an output voltage equal to the **Full-scale deflection** parameter value. For higher pressures, the output voltage remains at this **Full-scale deflection** value. You have three choices of operation mode, which let you select between vacuum, atmospheric pressure, or sealed-gauge reference pressure as the reference point for the pressure measurement. You also have an option of approximating the sensor dynamics by a first-order lag.

- The Resolver block models a generic resolver, which consists of a rotary transformer that couples an AC voltage applied to the primary winding to two secondary windings. These secondary windings are physically oriented at 90 degrees to each other. As the rotor angle changes, the relative coupling between the primary and the two secondary windings varies. In the Resolver block model, the first secondary winding is oriented such that peak coupling occurs when the rotor is at zero degrees, and therefore the second secondary winding has minimum coupling when the rotor is at zero degrees.

Nonlinear Transformer and Nonlinear Inductor blocks

Two new blocks in the Passive Devices library let you take into account nonlinearities in inductors and transformers due to magnetic saturation:

- The Nonlinear Inductor block represents an inductor with a core that is nonideal, due to its magnetic properties or dimensions. You have multiple options of block parameterization, including single inductance, single saturation point, magnetic flux versus current characteristic, and magnetic field density versus magnetic field strength characteristic.
- The Nonlinear Transformer block is based on the Nonlinear Inductor block and has similar parameterization options, which let you model varying levels of nonlinearity. You can parameterize the transformer winding either by combined primary and secondary values, or by separate values for primary and secondary leakage resistance and inductance.

DC-DC Converter block and Incandescent Lamp block

The new DC-DC Converter block in the Sources library represents a behavioral model of a power converter. The power converter regulates voltage on the load side and the required amount of power is drawn from the supply side to balance input power, output power, and losses. Optionally, the converter can support regenerative power flow from load to supply.

The new Incandescent Lamp block in the Passive Devices library models an incandescent lamp. The key characteristic of this block is that the resistance increases as the filament warms up. The rate of heat loss from the filament is proportional to the filament's temperature difference to ambient. Optionally, you can simulate the fault dynamics by specifying a simulation time at which the lamp fails.

Unipolar Stepper Motor block and Stepper Motor block that now account for iron losses

Compatibility Considerations: Yes

The new Unipolar Stepper Motor block in the Rotational Actuators library represents a stepper motor that has center taps on the two phase windings. All four half-windings are identical. The block lets you simulate thermal effects, and also accounts for iron losses, both in its electrical and thermal equations.

The existing Stepper Motor block has been enhanced to account for iron losses, as well. It now has an additional thermal port HR, corresponding to the rotor and associated iron losses. Additional parameters on the **Electrical** and **Thermal Port** tabs let you specify magnetizing resistance, rotor thermal mass and initial temperature, and the percentage of the magnetizing resistance associated with the magnetic path through the rotor.

Compatibility Considerations

If your existing model uses a Stepper Motor block with thermal ports exposed, the block now has an additional thermal port HR (corresponding to the rotor and associated iron losses). Leaving this new port unconnected results in a simulation-time error. If iron losses associated with the rotor are not important, you can connect the HR port to an Adiabatic Cup block.

New examples

Examples introduced in this version are:

- Automotive Alternator
- Nonlinear Inductor Characteristics
- Nonlinear Transformer Characteristics
- Parameterizing a TVS Diode
- Ultracapacitor With Converter
- Hybrid Vehicle Electrical Network

R2012a

Version: 2.1
New Features: Yes
Bug Fixes: No

Thermal Ports Available for Actuator Blocks and for Solar Cell Block

All the blocks in the Rotational Actuators and Translational Actuators libraries, as well as the Solar Cell block in the Sources library, can now have optional thermal ports. By default, the thermal ports are not displayed. To expose the thermal port, right-click on the relevant block in your model, and from the context menu select **Simscape block choices** > **Show thermal port**. This action displays the thermal port H on the block icon, and adds the **Thermal port** tab to the block dialog box.

This functionality is not always available for blocks in existing models, depending on when the model was last saved. If you right-click on a block in a model saved in a previous version, and the context menu item **Simscape block choices** does not appear, make a new copy of the block from the SimElectronics® library.

Fully Differential Op-Amp Block

The new Fully Differential Op-Amp block in the Integrated Circuits library models an operational amplifier with fully differential output, that is, not referenced to ground. The output common-mode voltage is controlled by the common-mode port `cm`. Internal resistors set the nominal output common-mode voltage to be midway between the values you provide for the positive and negative supply voltages. Applications include data acquisition where inputs are differential, for example, sigma-delta converters.

The block provides a behavioral model of a fully differential operational amplifier. It does not represent nonlinear effects, such as variation in gain with output voltage amplitude, and the nonlinear nature of the output voltage-current relationship for large load currents.

Transmission Line Block

The new Transmission Line block in the Passive Devices library lets you model a transmission line either by using delays, or by a lumped parameter model. Use the delay-based models for better simulation performance at system level. The lossless delay-based model represents an ideal transmission line.

Power Sensor Block

The new Power Sensor block in the Sensors library calculates the power taken by the load connected across the + and - terminals under the assumption that only the load is connected to the + terminal.

The sensor can return either instantaneous power, or power averaged over a fixed time period. The latter option is useful when working with periodic current and voltage waveforms, such as those associated with PWM control.

For an example of using this block, see the Flyback Converter demo.

Induction Motor Block Usability Enhancement

The usability of the Induction Motor block has been improved. In previous versions, when setting **Model parameterization** to `By motor ratings`, you had to provide a value for either the motor starting current or maximum torque. This group of parameters has been removed, and instead the **Rated RMS line current** parameter value is used to determine the total motor inductance. In existing models, if you used consistent values for **RMS starting (or locked rotor) line current** and **Rated RMS line current**, simulation results are the same as in previous versions.

Controlled PWM Voltage Block Enhancement

The Controlled PWM Voltage block has two new parameters, **Pulse delay time** and **Pulse width offset**. Use these parameters to add a small turn-on delay and a small turn-off advance. This can be helpful when fine-tuning switching times, to minimize switching losses.

Exponential Diode Block Now Models Charge Dynamics

The Diode block now lets you model charge dynamics. The Exponential diode model contains an additional set of parameters that let you either specify values for the transit time and carrier lifetime directly, or calculate them using the peak reverse current and reverse recovery time. This functionality is especially useful for applications such as commutation diodes.

New Demos

Demos introduced in this version are:

- Controllable Phase Shifter
- Low-Pass Filter Using Operational Transconductance Amplifiers
- Fourth-Order Sallen-Key Lowpass Filter
- Flyback Converter

R2011b

Version: 2.0
New Features: Yes
Bug Fixes: No

Thermal Ports Available for Semiconductor Blocks

Compatibility Considerations: Yes

All the blocks in the Semiconductors library, as well as the Photodiode and Light-Emitting Diode blocks in the Sensors library, can now have optional thermal ports. By default, the thermal ports are not displayed. To expose the thermal port, right-click on the relevant block in your model, and from the context menu select **Simscape block choices** > **Show thermal port**. This action displays the thermal port H on the block icon, and adds the **Thermal port** tab to the block dialog box.

Compatibility Considerations

In the N-Channel IGBT block, several new parameters on the **Advanced** tab have been added, to better match the typical device datasheets. The **Forward Early voltage, VAF** parameter, with the default value of 200 V, specifies the Forward Early voltage for the PNP transistor. Previously the effect was not modeled. This means that existing models will show small differences in the current-voltage relationship associated with the PNP bipolar transistor, compared to the previous version. Additionally, the new **Collector resistance, RC** and **Emitter resistance, RE** parameters have nonzero default values, to improve the numeric efficiency of computations. If you want to preserve the simulation results for the existing models, set **Forward Early voltage, VAF** to `1e10`, **Collector resistance, RC** to `0`, and **Emitter resistance, RE** to `0`.

New Operational Transconductance Amplifier Block

The Operational Transconductance Amplifier block, added to the Integrated Circuits library, provides a behavioral representation of an operational transconductance amplifier. A transconductance amplifier converts an input voltage into an output current. Applications include variable frequency oscillators, variable gain amplifiers, and current-controlled filters. These applications are based on the fact that the transconductance gain is a function of current flowing into the control current pin.

The block does not model the detailed transistor implementation. This results in faster simulation, but the model is only valid when operating in the linear region, that is, where the device input resistance, output resistance, and transconductance gain all depend linearly on the control current, and are independent of input signal amplitude.

New Push-Pull Output Block

The Push-Pull Output block, added to the Integrated Circuits library, provides a behavioral representation of a CMOS complementary output stage. To improve simulation speed, the block does not model all the internal individual MOSFET devices that make up the gate You can use this block to create a representative output current-voltage relationship when defining an integrated circuit model behavior with Physical Signal blocks from the Simscape™ Foundation library. For an example, see the Modeling an Integrated Circuit demo.

H-Bridge Block Enhancements

The following enhancements have been implemented for the H-Bridge block:

- In Averaged mode, a new **Load current characteristics** parameter is available with two options, `Smoothed` and `Unsmoothed or discontinuous`. The first option assumes that the current is practically continuous due to load inductance, and corresponds to the old block behavior. For cases where the current is not smooth, or goes to zero between PWM cycles, use the `Unsmoothed or discontinuous` option, and provide values for the new **Total load series resistance**, **Total load series inductance**, and **PWM frequency** parameters. During simulation, the block uses these values to calculate a more accurate value for H-bridge output voltage that achieves the same average current as would be present if simulating in PWM mode.
- The **Freewheeling mode** parameter is now available not only in PWM mode, but also in Averaged mode in cases where you select `Unsmoothed or discontinuous` for the **Load current characteristics** parameter.
- An additional **Freewheeling mode** option, `Via two semiconductor switches and one freewheeling diode`, controls the load by maintaining one high-side bridge arm permanently on and using the PWM signal to toggle between enabling the corresponding low-side bridge arm and the opposite high-side bridge arm. This means that the block uses a freewheeling diode in parallel with a bridge arm, plus another series bridge arm, to complete the dissipation circuit when the bridge turns off.
- The block dialog box has been reorganized using tabs, to improve usability.

DC Motor Block Supports No-Load Current Data for Rotor Damping

Compatibility Considerations: Yes

The DC Motor block has an additional option that lets you use no-load current data to calculate a value for rotor damping. This is helpful when the manufacturer datasheet does not provide an explicit rotor damping value.

The **Rotor damping parameterization** drop-down has been added to the **Electrical Torque** tab of the block dialog box, with the following values:

- `By damping value` — Specify a value for rotor damping directly, by using the **Rotor damping** parameter on the **Mechanical** tab. This is the default.
- `By no-load current` — The block calculates rotor damping based on the values that you specify for the **No-load current** and **DC supply voltage when measuring no-load current** parameters. If you select this option, the **Rotor damping** parameter is not available on the **Mechanical** tab.

Compatibility Considerations

Previously, if the **Model parameterization** parameter was set to `By stall torque & no-load speed` or `By rated power, rated speed & no-load speed`, the block did not take rotor damping into account. The new block equations always include rotor damping, because it is now tied to no-load current. Therefore, rated speed and no-load speed results for existing models using these options will be slightly different than in previous versions if the model has a nonzero damping value.

If you wish to retain the original behavior, set the rotor damping to zero, and add an external Rotational Damper block (from Simscape Foundation library) across the motor R and C ports.

New Demos

Demos introduced in this version are:

- IGBT Thermal Characteristics
- Low-Cost Voltage Regulator
- Synchronous Buck Converter With Thermal Dynamics
- Thermal Characteristics of a Synchronous Buck Converter

R2011a

Version: 1.6
New Features: Yes
Bug Fixes: No

Thermal Dependency Added to Semiconductor Blocks

Compatibility Considerations: Yes

Dialog boxes of most of the blocks in the Semiconductors library, and some related blocks, now have a new tab, **Temperature Dependence**, which lets you specify additional parameters to model the temperature dependence during simulation. For details, see reference pages of the following blocks:

- Diode
- Light-Emitting Diode
- N-Channel IGBT
- N-Channel JFET
- N-Channel MOSFET
- NPN Bipolar Transistor
- Optocoupler
- Photodiode
- P-Channel JFET
- P-Channel MOSFET
- PNP Bipolar Transistor

Compatibility Considerations

In NPN and PNP Bipolar Transistor blocks, a new parameter, **Collector-emitter voltage at which h-parameters are defined**, has been added. It serves to increase the accuracy with which equation parameters are calculated from h-parameters, to better capture current gain dependence on temperature. As a result, when you use `Specify from a datasheet` for the **Parameterization** parameter, there is a small change in the resulting transistor gain BF (calculated from the **Forward current transfer ratio h_fe** parameter value), compared to the previous version of the block.

New Demos

Demos introduced in this version are:

- Torque Motor
- Schottky Barrier Diode Characteristics
- IGBT Characteristics
- Master-Slave J-K Flip-Flop

Change to an existing demo:

- The Finite Element Parameterized Solenoid demo now includes comparison with the Simscape solenoid demo `ssc_solenoid.mdl`, to illustrate the effects of flux saturation.

R2010b

Version: 1.5
New Features: Yes
Bug Fixes: No

New Thyristor Block

The new Thyristor block, located in the Semiconductor Devices library, represents a thyristor modeled using an NPN and a PNP transistor. The collector of each device is connected to the base of the other device so as to give the P-N-P-N junction structure of a thyristor.

New Multiplier Block

The new Multiplier block, located in the Integrated Circuits library, represents an integrated circuit multiplier for physical signals. It allows you to multiply and divide signals without switching to Simulink signals and back.

Additional Exponential Diode Parameterization Options

When using the Diode block, with the **Diode model** parameter set to `Exponential`, you now have two additional options under **Parameterization**:

- `Use an I-V data point and IS` — Specify measured data at a single point on the diode I-V curve in combination with the saturation current.
- `Use an I-V data point and N` — Specify measured data at a single point on the diode I-V curve in combination with the emission coefficient.

See the block reference page for details.

Channel Modulation Parameter Added for MOSFET Blocks

The N-Channel MOSFET and P-Channel MOSFET blocks now have an additional parameter, **Channel modulation, L**. The default value is 0 1/V. See the respective block reference pages for details.

Changes to the Bipolar Transistor Blocks

The following changes have been implemented in the NPN Bipolar Transistor and PNP Bipolar Transistor blocks:

- The **Junction Capacitance** tab has been renamed to **Capacitance**, and the two existing parameters on it have been renamed:
  - **Base-emitter capacitance** to **Base-emitter junction capacitance**
  - **Base-collector capacitance** to **Base-collector junction capacitance**
- Two new parameters have been added to the **Capacitance** tab:
  - **Total forward transit time**, representing the mean time for the minority carriers to cross the base region from the emitter to the collector
  - **Total reverse transit time**, representing the mean time for the minority carriers to cross the base region from the collector to the emitter
- Default values for ohmic resistances have been changed to RB = 1 Ω, RC = 0.01 Ω, and RE = 1e-4 Ω, to be consistent with the SPICE-compatible library.

New Demos

Demos introduced in this version are:

- Thyristor Static Behavior Validation
- Thyristor Dynamic Behavior Validation
- IC Multiplier Circuits
- Synchronous Buck Converter

R2010a

Version: 1.4
New Features: Yes
Bug Fixes: No

New Linear and Rotary Motors Defined in Terms of Flux

Two new blocks represent models of a motor or actuator defined in terms of magnetic flux:

- FEM-Parameterized Linear Actuator block, located in the Translational Actuators library
- FEM-Parameterized Rotary Actuator block, located in the Rotational Actuators library

New Potentiometer Block

The new Potentiometer block, located in the Passive Devices library, represents a potentiometer, where the wiper position is controlled by the input physical signal.

Initial Conditions Tab Added for Logic Blocks

The dialog boxes of blocks in the Logic library now have an additional tab, Initial Conditions, which lets you specify the output initial state (low or high). See the respective block reference pages for details.

Changes in Block Parameterization

Compatibility Considerations: Yes

The ability to parameterize SimElectronics blocks by importing circuit data from a SPICE netlist is no longer supported. As a result, using the `netlist2sl` function is no longer recommended. See Parameterizing Blocks from Datasheets in the *SimElectronics User's Guide* for alternative ways of block parameterization. Additional related changes introduced in this version are:

- "Changes to the SPICE-Compatible Blocks" on page 43
- "Changes to the Solar Cell Block" on page 44

Changes to the SPICE-Compatible Blocks

The SPICE-compatible blocks have been moved to the Additional Components library. They are organized in sublibraries according to function, for example, the SPICE-Compatible Sources library is now the Sources sublibrary of the Additional Components/SPICE-Compatible Components library. The Resistor block, renamed SPICE Resistor, and the Current-Controlled Switch and Voltage-Controlled Switch blocks have been moved to the Passive Devices sublibrary of the Additional Components/SPICE-Compatible Components library.

Some of the blocks have been renamed so that their names start with the "SPICE" prefix. The following table lists the old and new block names.

Old Name	New Name
Diode (SPICE)	SPICE Diode
NJFET	SPICE NJFET
NMOS	SPICE NMOS
NPN	SPICE NPN
PJFET	SPICE PJFET
PMOS	SPICE PMOS
PNP	SPICE PNP
Resistor	SPICE Resistor

There are no compatibility considerations as a result of renaming the SPICE-compatible blocks and moving them to the Additional Components library. Your existing models will be updated automatically when you open and save them in the new version.

Changes to the Solar Cell Block

In previous versions, the Solar Cell block had the option of using the SPICE Environment Parameters block to set temperature. This is removed in R2010a to eliminate dependency on the SPICE sublibrary. Also, the Solar Cell model now uses the regular Diode block (exponential diode) rather than the SPICE Diode block.

Compatibility Considerations

There is an insignificant change in results, of the order of 1e-12, in the Solar Cell block because of the diode replacement.

New Demos

Demos introduced in this version are:

- Finite Element Parameterized Solenoid
- Circuit Level Switched Capacitor ADC
- Switching Audio Power Amplifier
- Bridge Configuration Switching Audio Power Amplifier
- Differential Pair Amplifier
- Low-Noise Bipolar Transistor Voltage Amplifier
- Triangle Wave Generator
- LC Transistor Oscillator
- Voltage-Controlled Oscillator with PI Control
- Voltage Regulator
- Band-Pass Filter Using Three Mutually-Coupled Inductors
- Class-E RF Amplifier
- Diode Ring Demodulator
- LC Transmission Line and Test Bridge

Functions and Function Elements Being Removed

Compatibility Considerations: Yes

Function or Function Element Name	What Happens When you use the Function or Element?	Use This Instead	Compatibility Considerations
`netlist2sl`	Issues a warning that it is not supported and may be removed in future releases	See Parameterizing Blocks from Datasheets in the *SimElectronics User's Guide* for alternative ways of block parameterization	See "Changes in Block Parameterization" on page 43

R2009b

Version: 1.3
New Features: Yes
Bug Fixes: No

Actuators & Drivers Library Blocks

Compatibility Considerations: Yes

New features and changes introduced in this version are:

- "New Generic Rotary Actuator Block" on page 48
- "New Generic Linear Actuator Block" on page 48
- "Improved Servomotor Block" on page 48

New Generic Rotary Actuator Block

The Generic Rotary Actuator block models the torque-speed characteristics of a generalized rotary actuator.

New Generic Linear Actuator Block

The Generic Linear Actuator block models the force-speed characteristics of a generalized linear actuator.

Improved Servomotor Block

The Servomotor block now allows for the specification of additional parameters from within the Block Parameters dialog box.

Compatibility Considerations

During simulation, the updated Servomotor block is backwards-compatible with models defined in earlier versions of the software. However, the model generates a warning in this version because the block dialog box supports additional unit options for torque and speed data. To remove the warnings, open the block dialog box and select appropriate units for the torque and speed data.

New Abstracted Timer Block

The new Timer block, located in the Integrated Circuits library, is an abstracted behavioral model of a timer integrated circuit, such as the NE555.

New Demos

Demos introduced in this version are:

- Brushless DC Motor
- ARINC 429 Communications Link
- PNP Bipolar Transistor Characteristics

R2009a

Version: 1.2
New Features: Yes
Bug Fixes: No

Actuators & Drivers Library

New features and changes introduced in this version are:

- "New Piezo Motor Blocks" on page 52
- "Enhanced H-Bridge Block" on page 52

New Piezo Motor Blocks

The Actuators & Drivers library now contains blocks for modeling piezoelectric travelling wave motors. The library contains these new blocks:

- The Piezo Rotary Motor models the torque-speed characteristics of a rotary piezoelectric motor.
- The Piezo Linear Motor models the force-speed characteristics of a linear piezoelectric motor.

Enhanced H-Bridge Block

The H-Bridge block now provides the option to dissipate current via two freewheeling diodes when the signal at the PWM port is low. To use this new option, select `Via two freewheeling diodes` for the `Freewheeling mode` parameter.

Passive Devices Library

New features and changes introduced in this version are:

- "New Switch Blocks" on page 53
- "New Resistor Block" on page 53
- "New Crystal Block" on page 53
- "Enhanced Variable Inductor and Variable Capacitor Blocks" on page 53

New Switch Blocks

The Passive Devices library now contains Current-Controlled Switch and Voltage-Controlled Switch blocks to model electrical switches with hysteresis.

New Resistor Block

The Passive Devices library now contains a Resistor block to model a resistor as a function of temperature and process data.

New Crystal Block

The Passive Devices library now contains a Crystal block to model the electrical characteristics of a crystal resonator.

Enhanced Variable Inductor and Variable Capacitor Blocks

The Variable Inductor and Variable Capacitor blocks have the following enhancements:

- The Variable Inductor block now provides two options for the relationship between the voltage across the device and the current through the inductor. The new **Equation** parameter lets you select the voltage-current equation that you want.
- The Variable Capacitor block now provides two options for the relationship between the current through the device and the voltage across the capacitor. The new **Equation** parameter lets you select the current-voltage equation that you want.

Sources Library

New features and changes introduced in this version are:

- "Enhanced Solar Cell Block" on page 54
- "New Two-Input Dependent Source Blocks" on page 54

Enhanced Solar Cell Block

The Solar Cell block has the following enhancements:

- The block now provides the option to use an 8-parameter model that includes an additional diode and a parallel resistor.
- The block now models temperature dependence.

New Two-Input Dependent Source Blocks

The SPICE-Compatible Sources library (in the Sources library) contains blocks for modeling dependent sources with two controlling inputs. The library contains these new blocks:

- PCCCS2 — Model polynomial current-controlled current source with two controlling inputs
- PCCVS2 — Model polynomial current-controlled voltage source with two controlling inputs
- PVCCS2 — Model polynomial voltage-controlled current source with two controlling inputs
- PVCVS2 — Model polynomial voltage-controlled voltage source with two controlling inputs

SPICE-Compatible Semiconductors Library

New features and changes introduced in this version are:

Enhanced NMOS and PMOS Blocks

The NMOS and PMOS blocks now provide the option to model the electrical characteristics of SPICE Level-3 MOSFET devices.

R2008b

Version: 1.1
New Features: Yes
Bug Fixes: No

New CMOS Logic Gate Blocks

The Logic library (in the Integrated Circuits library) contains blocks for modeling CMOS logic gates behaviorally. The library contains these new blocks:

- CMOS AND
- CMOS Buffer
- CMOS NAND
- CMOS NOR
- CMOS NOT
- CMOS OR
- CMOS XOR

New Piezo Stack Block

The Actuators & Drivers library now contains a Piezo Stack block to model the electrical and force characteristics of a piezoelectric stacked actuator.

New Relay Block

The Passive Devices library now contains a Relay block to model the resistive and delay characteristics of a relay controlled by an external physical signal.

New Fuse Block

The Passive Devices library now contains a Fuse block to model the following fuse characteristics:

- Resistance.
- Rated current at which the fuse blows when exceeded for a specified amount of time.

New NMOS and PMOS Blocks

The SPICE-Compatible Semiconductors library (in the Semiconductor Devices library) now contains NMOS and PMOS blocks to model the electrical characteristics of SPICE Level-1 MOSFET devices.

R2008a+

Version: 1.0
New Features: Yes
Bug Fixes: No

Product Introduction

SimElectronics software is a modeling environment for the engineering design and simulation of electronic and electromechanical systems within the Simulink® environment.

Version 1.0 includes these features:

- A library of electronic and electromechanical blocks that model components such as:
  - Sensors
  - Semiconductors
  - Actuators

  For these blocks, you enter key parameter values directly from industry datasheets.

  For more information about the available blocks, see SimElectronics Block Libraries.
- A function, `netlist2sl`, for creating library blocks that represent circuit data in a SPICE netlist.
- Ability to convert SimElectronics models to C code.

  For more information about code generation, see Code Generation in the Simscape documentation.
- Access to linearization and steady-state solve capabilities in Simscape.

  For more information about linearization, see Linearizing at an Operating Point in the Simscape documentation.

  For more information about how Simscape solves models, see How Simscape Simulation Works in the Simscape documentation.