

SiMKit

Release Notes for SiMKit version 5.2_pub

Eindhoven, October 2019

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Preface

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These are the release notes for simkit version 5.2_pub. Changes with respect to simkit 5.1.2_pub are reported in these release notes.

The main developments of this release are:

- An issue with the implementation of the noise modelling of MEXTRAM 505 was fixed
- JUNCAP200 version updated to 200.6.0 to be consistent with PSP 103.7.0
- An issue only affecting Spectre related to limiting was corrected
- Prefix "OVCHECK_" has been changed into the more general "SOACHECK_"
- The reporting of peak values in the SOACHECK_TR messages has changed
- The memory overhead for some instance data was reduced

Overview

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SiMKit is a simulator-independent compact transistor model library.

Simulator-specific connections are handled through so-called adapters that provide the correct interfacing to:

- Spectre(/APS): the Cadence circuit simulator.
- ADS: the Keysight circuit simulator.
Simkit 5.2_pub supports ADS 2012 and higher. The SiMKit distribution is also available for ADS on Windows for the same versions.

Mica from NXP, AFS from Mentor, GoldenGate from Keysight, FineSim and CustomSim(XA) from Synopsys and several other simulators (e.g. APLAC/MWO from AWR) do provide an adapter for the SiMKit models.

For a complete description, please refer to:

<http://www.nxp.com/models/simkit.html>

Model improvements and bug-fixes

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MEXTRAM 505.1.0

An issue with the implementation of the noise modelling of Mextram 505 was found in the previous SiMKit version. This issue is now fixed.

JUNCAP200 200.6.0

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- JUNCAP200 version updated to 200.6.0 to be consistent with PSP 103.7.0. This update had been forgotten in the previous version of SiMKit, this is now fixed.
 - The unit of the instance parameters LS, LG was corrected to "m". This does not affect any simulation results (only textual in spectre -h).

General

As a result of a more efficient code generation, the memory overhead of the instance data is reduced with about 35% for SPHV, 30% for PSP103 and 7% for PSP102.

Spectre specific

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An issue related to limiting was corrected. This issue was affecting models that do not provide any method for limiting. Some default method was still applied, this default method was removed so that no limiting is used for these models.

Improvements SOA checking

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- In simkit 5.2_pub the prefix "OVCHECK_" has been changed into the more general "SOACHECK_". SOA browsers within NXP will support both.
 - The reporting of peak values in the SOACHECK_TR messages has changed. Till SiMKit 5.2_pub, the SOACHECK_TR messages provide as the peak value the largest voltage that was detected on the branch for said device up until that point in time. Now the message provides the peak value for that specific violation of the safe region. The largest value for the entire transient analysis is still provided in the SOACHECK_INFO and SOACHECK_TR_END messages in the summary at the end of the transient analysis. So, in effect SiMKit 5.2_pub provides more detailed information in the SOACHECK messages.

Known limitations

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Overvoltage checking:

- Overvoltage checks do not give warnings in ADS as in Spectre. The full functionality is only available in Spectre, APS and in Mentor AFS per 2015_Q1_updatel.

Flexible topology in ADS and Spectre:

- A device will choose its topology based on the settings of certain parameters. So, e.g. a sweep of the parameter RGO (gate resistor) in PSP going from zero to another value, or a sweep over SWNQS in PSPNQS is not possible. The simulator will stop with an appropriate message because continuation would result in erroneous results.
- Internal node names in ADS for models with a flexible topology (in simkit 5.2_pub those are PSP, PSPNQS, MXT504, M1101 and M1102) might be wrong in the simulator output. The simulation results are not affected by this.

Instance scaling in ADS:

- Scaling of instance parameters via the option scale is not supported in ADS versions lower than 2019.1.

Transient noise:

- Transient noise simulations with MOST devices are currently not supported. The noise results are unreliable. A workaround is to switch off induced gate noise, which can be done in mos 1101 and 1102 by setting GATENOISE=1.

- In simkit 4.8.1_pub a switch SWIGN was added to PSP103:
- . For SWIGN=1 (default) the behavior is the same as in previous simkit versions.
 - . For SWIGN=0 the induced gate noise is switched off.

SiMKit models

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The SiMKit library contains the most recent versions of the NXP transistor models. The following tables list the SiMKit models. The first table lists the 'real' SiMKit models while the second table lists the pre-SiMKit models, for which only a Spectre implementation is available.

In the following tables,
 'e/g' stands for electric/geometric
 't' stands for self-heating and
 's' stands for substrate model

Table 1: Real SiMKit models

model	level	Spectre/APS/AFS	ADS	e/g	t	s
juncap	1	juncap	juncap	e	no	no
juncap	200	juncap200	juncap200	e	no	no
psp	102	psp102e	psp102e	e*	no	no
psp	1020	psp1020	psp1020	g*	no	no
psp	1021	psp1021	psp1021	g*	no	no
pspnqs	102	pspnqs102e	pspnqs102e	e*	no	no
pspnqs	1020	pspnqs1020	pspnqs1020	g*	no	no
pspnqs	1021	pspnqs1021	pspnqs1021	g*	no	no
psp	103	psp103	psp103	eg	no	no
psp	103	psp103t	psp103t	eg	yes	no
pspnqs	103	pspnqs103	pspnqs103	eg	no	no
modella	500	bjt500	bjt500	e	no	no
modella	500	bjt500t	bjt500t	e	yes	no
mextram	504	bjt504	bjt504	e	no	yes
mextram	504	bjt504t	bjt504t	e	yes	yes
mextram	504	bjtd504	bjtd504	e	no	no
mextram	504	bjtd504t	bjtd504t	e	yes	no
mextram	505	bjt505	bjt505	e	no	yes
mextram	505	bjt505t	bjt505t	e	yes	yes
mextram	505	bjtd505	bjtd505	e	no	no
mextram	505	bjtd505t	bjtd505t	e	yes	no
mos	903	mos903e	mos903e	e	no	no
mos	903	mos903	mos903	g	no	no
mos	903	mos903t	mos903t	g	yes	no
mos	1101	mos1101e	mos1101e	e	no	no
mos	1101	mos1101et	mos1101et	e	yes	no
mos	11010	mos11010	mos11010	g	no	no
mos	11010	mos11010t	mos11010t	g	yes	no
mos	11011	mos11011	mos11011	g	no	no
mos	11011	mos11011t	mos11011t	g	yes	no
mos	1102	mos1102e	mos1102e	e	no	no
mos	1102	mos1102et	mos1102et	e	yes	no
mos	11020	mos11020	mos11020	g	no	no
mos	11020	mos11020t	mos11020t	g	yes	no
mos	11021	mos11021	mos11021	g	no	no
mos	11021	mos11021t	mos11021t	g	yes	no
mos	3100	mos3100	mos3100	e	no	no
mos	3100	mos3100t	mos3100t	e	yes	no
mos	40	mos40	mos4000/mos40	e	no	no
mos	40	mos40t	mos4000t/mos40t	e	yes	no
rflmos	602	rflmos602t	rflmos602t	g	yes	yes**
rflmos	602	rflmos602dt	rflmos602dt	g	yes	yes**
jfetidg	1	jfetidg	jfetidg	g	no	no
jfetidgt	1	jfetidgt	jfetidgt	g	yes	no
ovcheck	1	ovcheck	ovcheck	-	-	-
ovcheck	6	ovcheck6	ovcheck6	-	-	-

* For PSP the electrical model is referred to as the local model and the geometrical model as the global model.

** In the rfldmos model, substrate effects are modeled but the substrate is connected to the source and not available as a separate terminal.

Table 2: Other (older) models (Spectre specific)

model	level	Spectre
diode	500	dio500
mos	902	mos902
mextram	503	bjt503
lpnp	301	bjt301
mos	705	mos705

From simkit 4.8_pub onwards, the mextram 3500 model is no longer supported. From simkit 4.0_pub onwards, mos1100, mos2002 and mos3002 are no longer supported. If these models are needed, please use older SiMKit versions and simulator versions compatible with these older SiMKit versions.

SiMKit interface

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Simkit 5.2_pub incorporates interface version 11 which is backward compatible with version 10 used in simkit 4.7_pub-5.0_pub and with version 9 used in 4.4_pub-4.6_pub and with version 8 used in simkit 4.0_pub-4.3_pub but not backward compatible with the interface versions used in simkit 3.8_pub and earlier.

The interface description document [simkitInterfaceDescription.pdf](#) is contained in the zipped model library.