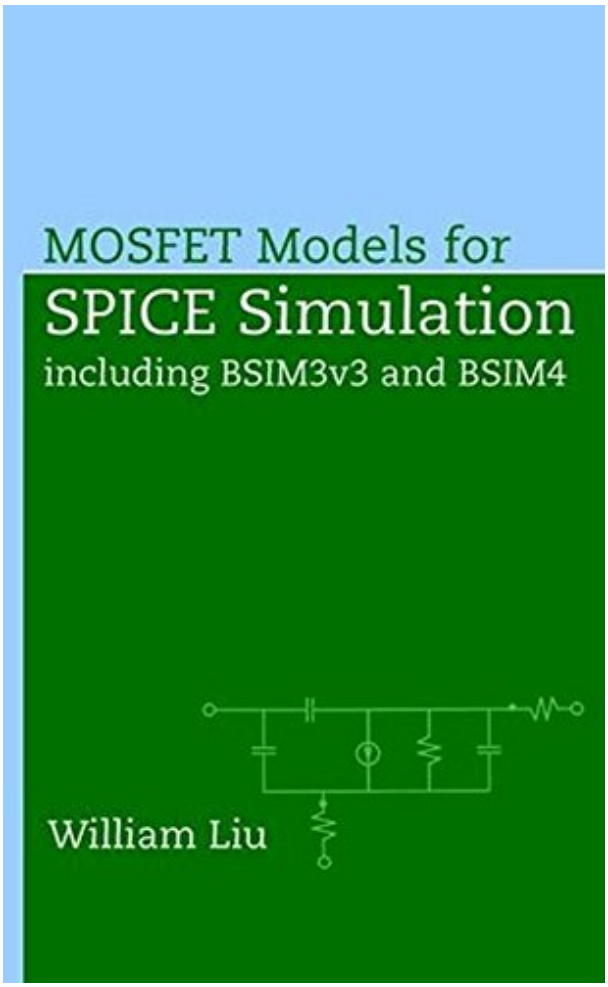
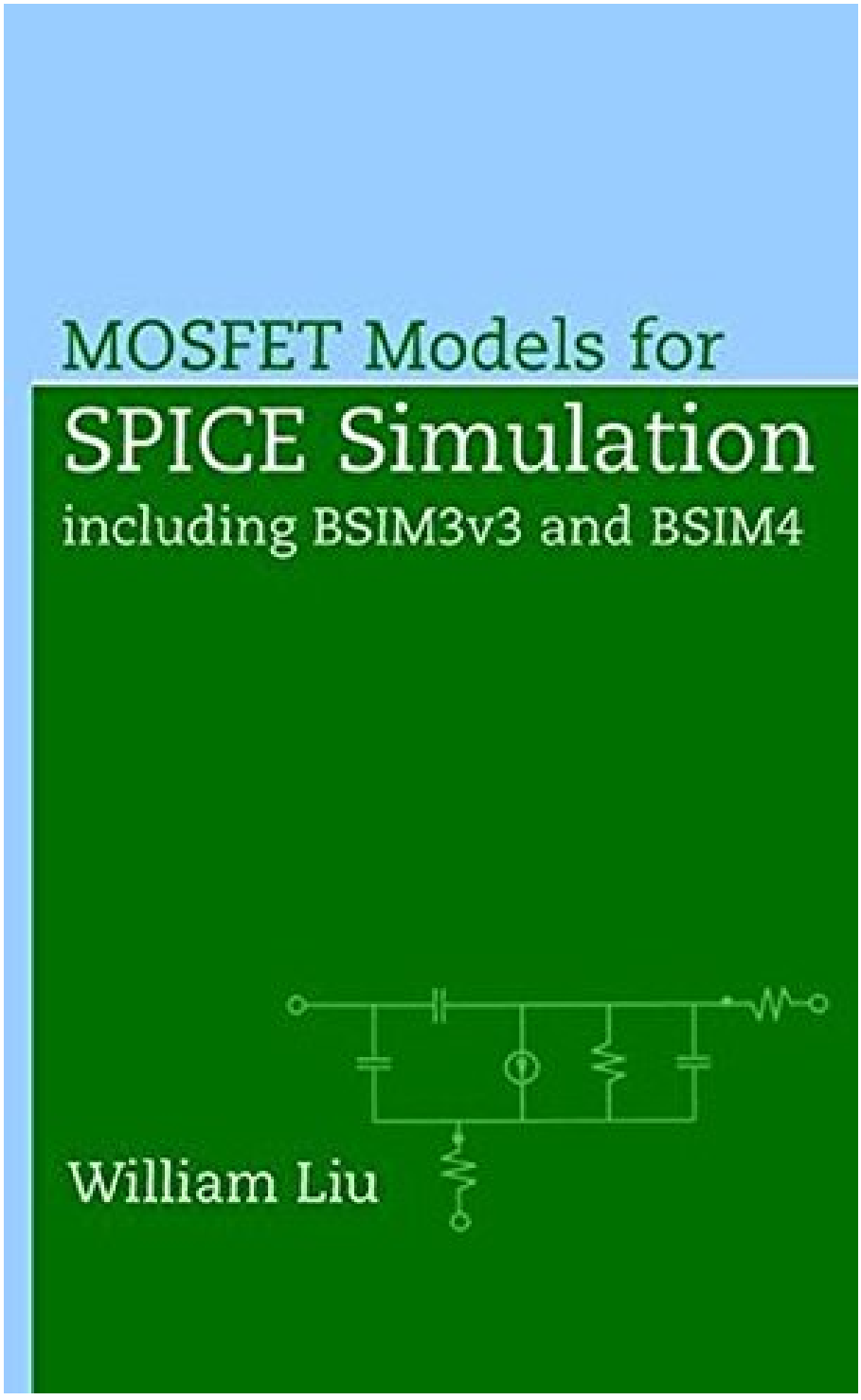
MOSFET MODELS FOR SPICE SIMULATION: INCLUDING BSIM3V3 AND BSIM4 BY WILLIAM LIU





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From the Back Cover
An expert guide to understanding and making optimum use of BSIM

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About the Author
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By William Liu
I am the author William Liu. I notice there is no link to the book content (as of May, 2001). Therefore, I thought I would add that here. I am sorry to have to rate my own book a five star before I can put put forth the book content in this review space. Nonetheless, it is indeed my view that the book is a five star, an opinion which I believe, can be justified by the content shown next.
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CHAPTER 1 MODELING JARGONS
1-1 SPICE Simulator and SPICE Model 1-2 Numerical Convergence 1-3 Digital and Analog Models 1-4 Smoothing Function and Single Equation 1-5 Chain Rule 1-6 Quasi-Static Approximation 1-7 Terminal Charges and Charge Partition 1-8 Charge Conservation 1-9 Non-Quasi-Static and Quasi-Static y-Parameters 1-10 Source-Referencing and Inverse Modeling 1-11 Physical vs. Table-Lookup Models 1-12 Scalable Model and Device Binning
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CHAPTER 4 IMPROVABLE AREAS OF BSIM3
4-1 Lack of Robust Non-Quasi-Static Model; Transient Analysis 4-2 Problem with the 40/60 Partition: The "Killer NOR Gate" 4-3 Lack of Channel Resistance (NQS Effect; Small-Signal Analysis) 4-4 Incorrect Transconductance Dependency on Frequency 4-5 Lack of Gate Resistance (and Associated Noise) 4-6 Lack

of Substrate Distibuted Resistance (and Associated Noise) 4-7 Incorrect Source/Drain Asymmetry at VDS = 0 4-8 Incorrect Cgb Behaviors 4-9 Capacitances with Wrong Signs 4-10 Cgg Fit and Other Capacitance Issues 4-11 Insufficient Noise Modeling (No Excess Short-Channel Thermal Noise) 4-12 Insufficient Noise Modeling (No Channel-Induced Gate Noise) 4-13 Incorrect Noise Figure Behavior 4-14 Inconsistent Input-Referred Noise Behavior 4-15 Possible Negative Transconductances 4-16 Lack of GIDL (Gate Induced Drain Leakage) Current 4-17 Incorrect Subthreshold behaviors 4-18 Threshold Voltage Rollup 4-19 Problems associated with a nonzero RDSW 4-20 Other Nuisances
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4 of 4 people found the following review helpful.
Delightful!
By Al Kordesch
This is clearly the best and newest book on MOSFET models. It's Liu's third book, and it's delightful. That's a strange word for a technical book, but it's true! This book is both practical (down to earth) and occasionally funny.
I must admit... I haven't read all 588 pages yet, but the sections I have read are all clearly written, well illustrated and there is just enough background information to make the topics interesting. For example when he discusses the possibility of BSIM3 calculating a negative back-gate transconductance, gmb, or a negative mutual transconductance, gm, he points out that a negative gm has actually been reported in a real device, and gives the reference. Then he gives a checklist you can use to help prevent the negative gmb problem in your model.
I was particularly interested and amused by his explanation of the "Killer NOR Gate" in section 4.2 "Problems with the 40/60 Partition." This circuit caused a lot of interesting e-mail discussion a couple of years ago.
His chapter 3 contains a very good 130-page "ALPHABETICAL GLOSSARY OF BSIM3 PARAMETERS." Anybody who works with BSIM3 knows you need a handy list of all the model parameters and what they mean. Liu devotes a couple of paragraphs to each, and he recommends leaving many of them equal to zero!
I'm more of a SPICE model user, not so much a theorist, and I found this book to be exactly what I needed.
The other recent classics on this subject are Cheng & Hu's MOSFET Modeling & BSIM3 User's Guide (1999), Arora's MOSFET Models for VLSI Circuit Simulation (1993) and Foty's MOSFET Modeling with SPICE (1996).

4 of 5 people found the following review helpful.
A Must Have Text
By someone302
William Liu (SML Modeling Expert/DMTS) has recently authored an excellent text on the BSIM3 and BSIM4 SPICE models. It is a "must have" text for modeling engineers, designers, or PIs who would like a deeper understanding of the BSIM3/4 models. William's sense of humor is evident throughout the text which makes the deep technical aspects even more fun. Check out "Mosfet Models for Spice Simulation."

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