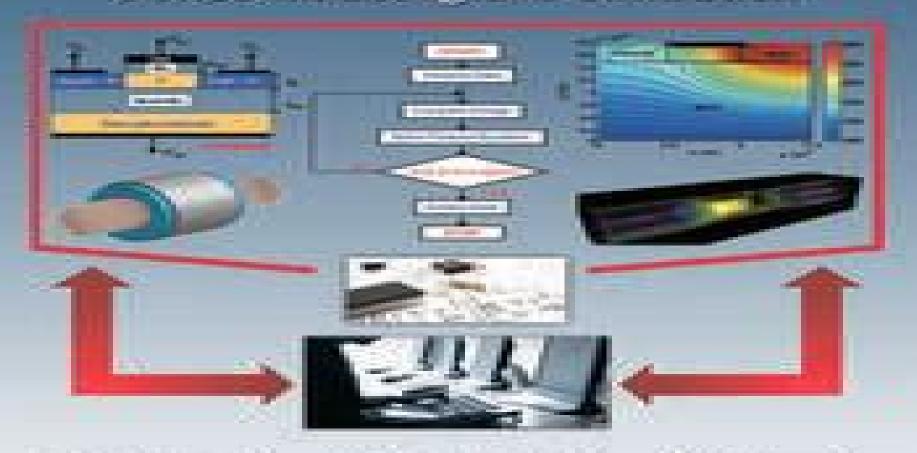
Computational Electronics

Semi-Classical and Quantum Device Modeling and Simulation



D. Vasileska * S.M. Goodnick * G. Klimeck



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Computational Electronics Dragica Vasileska, Stephen Marshall Goodnick, 2002 Computational Electronics Dragica Vasileska, Stephen M. Goodnick, Gerhard Klimeck, 2017-12-19 Starting with the simplest semiclassical approaches and ending with the description of complex fully quantum mechanical methods for quantum transport analysis of state of the art devices Computational Electronics Semiclassical and Quantum Device Modeling and Simulation provides a comprehensive overview of the essential techniques and methods for effectively analyzing transport in semiconductor devices With the transistor reaching its limits and new device designs and paradigms of operation being explored this timely resource delivers the simulation methods needed to properly model state of the art nanoscale devices. The first part examines semiclassical transport methods including drift diffusion hydrodynamic and Monte Carlo methods for solving the Boltzmann transport equation Details regarding numerical implementation and sample codes are provided as templates for sophisticated simulation software The second part introduces the density gradient method quantum hydrodynamics and the concept of effective potentials used to account for quantum mechanical space quantization effects in particle based simulators Highlighting the need for quantum transport approaches it describes various quantum effects that appear in current and future devices being mass produced or fabricated as a proof of concept In this context it introduces the concept of effective potential used to approximately include quantum mechanical space quantization effects within the semiclassical particle based device simulation scheme Addressing the practical aspects of computational electronics this authoritative resource concludes by addressing some of the open questions related to quantum transport not covered in most books Complete with self study problems and numerous examples throughout this book supplies readers with the practical understanding required to create their own simulators Computational Electronics Karl Hess, J.P. Leburton, U. Ravaioli, 2013-03-14 Large computational resources are of ever increasing importance for the simulation of semiconductor processes devices and integrated circuits The Workshop on Computational Electronics was intended to be a forum for the dis cussion of the state of the art of device simulation Three major research areas were covered conventional simulations based on the drift diffusion and the hydrodynamic models Monte Carlo methods and other techniques for the solution of the Boltzmann transport equation and computational approaches to quantum transport which are relevant to novel devices based on quantum interference and resonant tunneling phenomena Our goal was to bring together researchers from various disciplines that contribute to the advancement of device simulation These include Computer Sci ence Electrical Engineering Applied Physics and Applied Mathematics The suc cess of this multidisciplinary formula was proven by numerous interactions which took place at the Workshop and during the following three day Short Course on Computational Electronics The format of the course including a number of tutorial lectures and the large attendance of graduate students stimulated many discussions and has proven to us once more the importance of cross fertilization between the different disciplines Computational

Electronics ,1991 *Journal of Computational Electronics*, 2002 Computational Electronics Dragica / Goodnick Book of Abstracts International Workshop on Computational Electronics (11, 2006, Wien), 2006 Vasileska (Stephen M.), Computational Single-Electronics Christoph Wasshuber, 2012-12-06 From the reviews This is a well written book offering a clear and detailed insight into physical processes and numerical procedures essential to the single electron dynamics in electro conducting media Zentralblatt f r Mathematik und ihre Grenzgebiete **Book of abstracts / 16th International** Workshop on Computational Electronics: [June 4-7, 2013, Nara, Japan] International Workshop on Computational Electronics (16, 2013, Nara), 2013 18th International Workshop on Computational Electronics Gerhard Klimeck, A. Afzalian, A. Sengupta, A. Roche, Z. Aksamija, A. Kefayati, M. Aldegunde, C. Alexander, A. Thean, S. Algahtani, T. Ameen, M. A. Stroscio, J. Appenzeller, B. Aradi, Y. C. Tsai, J. Barker, J. W. Jerome, J. Bermeo Lopez, G. H. Bernstein, S. Berrada, M. Bescond, S. Blawid, J. Bohorquez-Ballen, L. Bourdet, S. Bowden, T. B. Boykin, D. Brinkman, A. R. Brown, F. Brunetti, E. Bury, H. Carrillo-Nuñez, N. Cavassilas, A. Strachan, C. Jirauschek, F. W. Chen, G. H. Chen, C. Y. Chen, B. Cheng, V. Chimalgi, M. S. Choi, M. Chung-Nguyen, C. Mangold, E. Colomes, M. R. Connolly, C. Gelly, G. Cuniberti, T. Cusati, A. Dabral, D. Perić, D. Selli, R. Daugherty, A. H. Davoody, C. Delerue, D. Wickramaratne, H. Dey, P. Dollfus, D. Donadio, D. Guo, I. Duchemin, D. Marian, A. M. El-Sayed, P. Ellinghaus, M. A. Elmessary, T. Fang, J. Huang, F. Michelini, J. S. Friedman, A. Fediai, D. K. Ferry, G. Fiori, M. V. Fischetti, J. Fonseca, A. Fortunelli, F. Mitterbauer, T. Frauenheim, W. R. Frensley, F. Karimi, A. J. Gabourie, G. Iannaccone, L. Genovese, V. P. Georgiev, L. Gerrer, J. Ghosh, G. Seifert, W. Goes, S. M. Goodnick, T. Grasser, G. Groeseneken, X. Guo, H. Guo, D. Guzman, R. Hathwar, E. R. Hedin, E. D. Herbschleb, C. Huang, H. Viet Nguyen, Z. Ikonic, H. Ilatikhameneh, J. Maassen, T. Jayasekera, Z. Jiang, Y. S. Joe, O. Jonasson, B. Kaczer, K. Kalna, M. Karner, R. W. Kelsall, C. Kernstock, K. A. Khair, P. Kivisaari, I. Knezevic, A. Kommini, H. Kosina, T. Kubis, C. N. Lai, L. Raymond, L. Yin, M. Lannoo, A. Laturia, M. Y. Lee, D. Lemus, J. Lindberg, Y. Li,X. Liu,L. Liu,N. Locatelli,P. Long,A. Loureiro,M. Lundstrom,M. Masahara,W. Magnus,S. Mahapatra,P. Marconcini,M. Schröter, P. N. Martin, S. Mei, D. Mejia, X. Meshik, S. Migita, C. Millar, H. Miranda, A. Mizrahi, W. Mizubayashi, J. Morales Escalante, M. Thesberg, Y. Morita, S. Mothes, S. Mukherjee, P. Muralidharan, D. Nagy, H. Nakamura, A. Narayan, M. Nedjalkov, S. Neogi, N. Neophytou, M. Neupane, Y. M. Niguet, R. Nishat, B. Novakovic, J. H. Oh, Y. Okada, N. Onofrio, X. Oriols, A. O. Orlov, M. B. Orvis, D. Osintsev, H. Ota, A. Pacheco, P. Paletti, A. Papp, K. H. Park, P. Rinke, A. Pecchia, G. Penazzi, P. Sarangapani, S. Poduri, W. Porod, M. Povolotskyi, A. Price, S. Qazi, D. Querlioz, M. Quint, H. M. Rafferty, R. Rahman, K. Raleva, M. Rashid, U. Ravaioli, C. Ringhofer, M. Rodwell, I. Rungger, H. Sahasrabudhe, J. Saint-Martin, S. Selberherr, I. Sankin, Y. B. Shi, J. Shi, A. L. Shluger, H. Sirikumara, Z. Stanojević, V. Sverdlov, G. P. Szakmany, Y. P. Tan, D. Teich, E. Towie, V. T. Tran, J. Tulkki, G. Ulisse, D. Vasileska, R. Valin, M. L. Van de Put, W. G. Vandenberghe, A. S. Verhulst, D. Verreck, A. F. Vincent, D. Vodenicarevic, A. Wacker, L. Zhang, K. Wang, E. Wilson, Y. Wimmer, D. O. Winge, L. Wirtz, Y. Wu, S. Xiong, C. Y. Yam, T. Yasuda, G. Yin, K. Yoshida, L. Zentner, Z. Zhen, Network for Computational Nanotechnology (NCN), J. Wright, E. Zhu, 2015-08-27

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