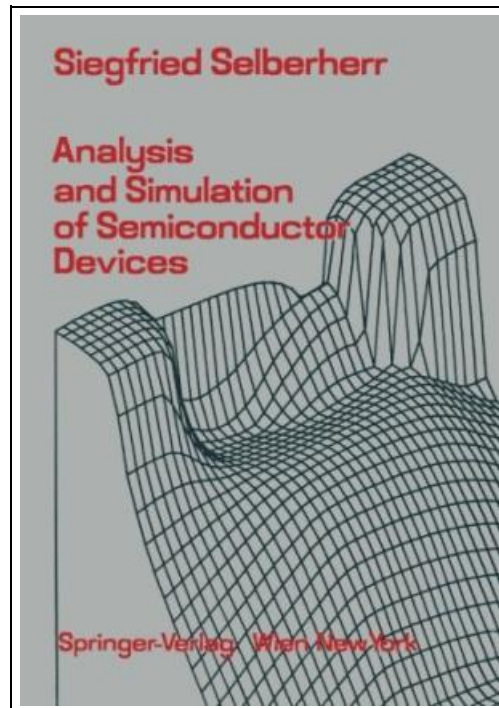


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ANALYSIS AND SIMULATION OF SEMICONDUCTOR DEVICES



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Condition: New. Publisher/Verlag: Springer, Wien | The invention of semiconductor devices is a fairly recent one, considering classical time scales in human life. The bipolar transistor was announced in 1947, and the MOS transistor, in a practically usable manner, was demonstrated in 1960. From these beginnings the semiconductor device field has grown rapidly. The first integrated circuits, which contained just a few devices, became commercially available in the early 1960s. Immediately thereafter an evolution has taken place so that today, less than 25 years later, the manufacture of integrated circuits with over 400.000 devices per single chip is possible. Coincident with the growth in semiconductor device development, the literature concerning semiconductor device and technology issues has literally exploded. In the last decade about 50.000 papers have been published on these subjects. The advent of so called Very-Large-Scale-Integration (VLSI) has certainly revealed the need for a better understanding of basic device behavior. The miniaturization of the single transistor, which is the major prerequisite for VLSI, nearly led to a breakdown of the classical models of semiconductor devices. | 1. Introduction.- 1.1 The Goal of Modeling.- 1.2 The History of Numerical Device Modeling.- 1.3 References.- 2. Some Fundamental Properties.- 2.1 Poisson's Equation.- 2.2 Continuity Equations.- 2.3 Carrier Transport Equations.- 2.4 Carrier Concentrations.- 2.5 Heat Flow Equation.- 2.6 The Basic Semiconductor Equations.- 2.7 References.- 3. Process Modeling.- 3.1 Ion Implantation.- 3.2 Diffusion.- 3.3 Oxidation.- 3.4 References.- 4. The Physical Parameters.- 4.1 Carrier Mobility Modeling.- 4.2 Carrier Generation-Recombination Modeling.- 4.3 Thermal Conductivity Modeling.- 4.4 Thermal Generation Modeling.- 4.5 References.- 5. Analytical Investigations About the Basic Semiconductor Equations.- 5.1 Domain and Boundary Conditions.- 5.2 Dependent Variables.- 5.3 The Existence of Solutions.- 5.4 Uniqueness or Non-Uniqueness of Solutions.- 5.5 Sealing.- 5.6 The Singular Perturbation Approach.- 5.7 References.- 6. The Discretization of the Basic Semiconductor Equations.- 6.1...



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