

On carrier transport modeling in semiconductor devices at WIAS: a survey

Dedicated to H.Gajewski on the occasion of his 70th birthday

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The talk gives a survey on quantum transport modeling in micro- and nano-devices since 1980 at WIAS. In detail the modeling by drift-diffusion models is presented. In particular, existence and uniqueness results as well asymptotic behavior of the solutions of such models are discussed. Moreover, it is indicated how one includes optoelectronic and thermoelectric effects in such models. Furthermore, the modeling of quantum effects in nano-devices is referred, in particular, results for nano-wires are presented. Finally, the idea of a hybrid model which combines drift-diffusion description with a quantum mechanical description of a device is developed.