

20 YEARS OF MATHEMATICAL SEMICONDUCTOR MODELLING: A REVIEW

&

MODEL REDUCTION FOR SEMICONDUCTOR INVERSE DOPANT PROFILING

P. A. Markowich

We investigate the reconstruction of semiconductor doping profiles from indirect measurements of device characteristics, such as voltage-current and voltage-capacitance maps. Our starting point is the identification problem with the well-known drift-diffusion systems as the underlying model, which leads to a large-scale inverse problem that is difficult to handle theoretically as well as numerically. Under certain conditions, the drift-diffusion model (and the resulting device characteristics) can be approximated by reduced models, like a version of the inverse conductivity problem. The aim of these lectures is to show that different model reductions yield variants of well-known inverse problems, which can be solved with less numerical effort in order to obtain at least a first guess of the doping profile. In addition, the mathematical analysis of the reduced inverse problems provides valuable insight into the amount of data needed for the uniqueness of reconstructions. (Joint work with M. Burger)