

**Part I**  
**Introduction**

The following two chapters are of introductory nature. First, we present a summary of basic notions and definitions from semiconductor physics. Only those subjects relevant to the subsequent chapters are included here. Second, we explain the strategy of deriving macroscopic model equations from the microscopic Boltzmann equation by assuming dominant scattering. Here, we distinguish the diffusion scaling, leading to diffusive models which are mathematically of parabolic type, and the hydrodynamic scaling, leading to hydrodynamic models which are mathematically of hyperbolic type.