

**Part III**  
**Macroscopic Semi-Classical Models**

The following chapters are concerned with the formal derivation of semi-classical macroscopic transport models for semiconductors. As detailed in Chap. 2, there are two classes of macroscopic equations: diffusive and hydrodynamic models whose complexity is distinguished by the number of moments involved in the derivation. We begin with the derivation of diffusive equations, starting from the most simple ones, the drift-diffusion equations which involve a single moment, the particle density. Then the energy-transport equations for two moments, the particle density and the energy density, are studied. Employing more than two moments leads to so-called higher-order diffusive moment models. Furthermore, the hydrodynamic semiconductor equations involving three moments, the particle density, momentum, and energy density, and their extensions are derived.