Part I

Correlation Functions and Kinetic Equations

The first part of this volume will deal with the general formalism of nonequilibrium statistical mechanics. Historically there have been different formalisms developed for different nonequilibrium phenomena. In the meantime it has turned out that the formalism of correlation, relaxation and memory functions can serve as a common basis for most phenomena. This formalism will be introduced in a reasonably general and deductive way. In order not to be too abstract and formal we consider a number of simple examples for applications of the general formalism taken from the theory of Brownian motion. Sections which are of such, more pedagogical, nature, discussing general results in terms of simple examples, are marked by a single asterisk (*). Sections with a double asterisk (**) are intended to provide additional background information and cross-relations to other fields of physics.

Formulae are numbered consecutively within each chapter. When referring back to several formulae from one section we adopt the notation (7.8,9,11), for example, instead of (7.8), (7.9) and (7.11), etc. References are provided at the end of the volume. They are referred to by numbers in square brackets in the text. Suggestions for further or complementary reading are also provided at the end.