

Part II

Irreversible Thermodynamics

Irreversible thermodynamics deals with the solution of irreversible equations (relaxation equations, kinetic equations, transport equations, etc.) as well as the determination of the thermal and quantum mechanical fluctuations of certain specified variables. Sometimes these variables are “macroscopic” and/or “slow” but sometimes one is also interested in “microscopic” parameters (such as the position and momentum of a Brownian particle), and/or the high-frequency behaviour of quantities (such as electronic charges and currents).

The kinetic coefficients in the kinetic equations are considered as adjustable phenomenological parameters – in contrast to the third part of this volume, where they are explicitly calculated from microscopic theory.

The chapters of this part are ordered more or less according to the number of variables occurring in the various problems. The first chapter deals with just a single variable: the charge $Q = CV$ or the current $J = V/R$ in an RC circuit. We then proceed to two or more discrete variables, to continuous variables in coordinate space (treating diffusion, hydrodynamics, electrodynamics), continuous variables in momentum space, and finally in phase space.