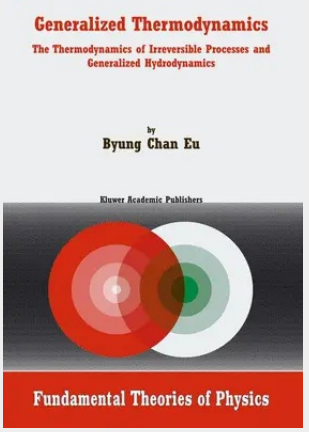
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Generalized Thermodynamics

The Thermodynamics of Irreversible Processes and Generalized Hydrodynamics



Despite a long history of almost 180 years stretching back to the times of Carnot and, later, Clausius and Lord Kelvin, amongst others following him, the subject of thermodynamics has not as yet seen its full maturity, in the sense that the theory of irreversible processes has remained incomplete. The works of L. Onsager, J. Meixner, I. Prigogine on the thermodyn- ics of linear irreversible processes are, in effect, the early efforts toward the desired goal of giving an adequate description of irreversible processes, but their theory is confined to near-equilibrium phenomena. The works in recent years by various research workers on the extension of the aforem- tioned thermodynamic theory of linear irreversible processes are further efforts toward the goal mentioned. The present work is another of such efforts and a contribution to the subject of generalizing the thermodyn- ics of reversible processes, namely, equilibrium thermodynamics, to that of irreversible processes—non-equilibrium thermodynamics, without being restricted to linear irreversible processes. In this context the terms ‘far - moved from equilibrium’ is often used in the literature, and such states of macroscopic systems and non-linear irreversible phenomena in them are the objects of interest in this work. The thermodynamics of processes, either reversible or irreversible, is a continuum mechanical theory of matter and energy and their exchange between different parts of the system, and as such it makes no direct r- erence to the molecules constituting the substance under consideration.

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