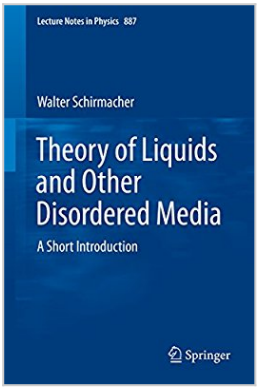

Theory of Liquids and Other Disordered Media: A Short Introduction (Lecture Notes in Physics)

By Walter Schirmacher

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This set of lectures provides an introduction to the structure, thermodynamics and dynamics of liquids, binary solutions and polymers at a level that will enable graduate students and non-specialist researchers to understand more specialized literature and to possibly start their own work in this field.

Part I starts with the introduction of distribution functions, which describe the statistical arrangements of atoms or molecules in a simple liquid. The main concepts involve mean field theories like the Perkus-Yevick theory and the random phase approximation, which relate the forces to the distribution functions.

In order to provide a concise, self-contained text, an understanding of the general statistical mechanics of an interacting many-body system is assumed. The fact that in a classic liquid the static and dynamic aspects of such a system can be discussed separately forms the basis of the two-fold structure of this approach.

In order to allow polymer melts and solutions to be discussed, a short chapter acquaints readers with scaling concepts by discussing random walks and fractals.

Part II of the lecture series is essentially devoted to the presentation of the dynamics of simple and complex liquids in terms of the generalized hydrodynamics concept, such as that introduced by Mori and Zwanzig. A special topic is a comprehensive introduction of the liquid-glass transition and its discussion in terms of a mode-coupling theory.

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Editorial Review

From the Back Cover

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