

Preface to the Second Edition

The first edition of this book was written in the wake of an unprecedented advance in our understanding of the microscopic structure and dynamics of simple liquids. The rapid progress made in a number of different experimental and theoretical areas had led to a rather clear and complete picture of the properties of simple atomic liquids. In the ten years that have passed since then, interest in the liquid state has remained very active, and the methods described in our book have been successfully generalised and applied to a variety of more complicated systems. Important developments have therefore been seen in the theory of ionic, molecular and polar liquids, of liquid metals, and of the liquid surface, while the quantitative reliability of theories of atomic fluids has also improved.

In an attempt to give a balanced account both of the basic theory and of the advances of the past decade, this new edition has been rearranged and considerably expanded relative to the earlier one. Every chapter has been completely rewritten, and three new chapters have been added, devoted to ionic, metallic and molecular liquids, together with substantial new sections on the theory of inhomogeneous fluids. The material contained in Chapter 10 of the first edition, which dealt with phase transitions, has been omitted, since it proved impossible to do justice to such a large field in the limited space available. Although many excellent review articles and monographs have appeared in recent years, a comprehensive and up-to-date treatment of the theory of “simple” liquids appears to be lacking, and we hope that the new edition of our book will fill this gap. The choice of material again reflects our own tastes, but we have aimed at presenting the main ideas of modern liquid-state theory in a way that is both pedagogical and, so far as possible, self-contained. The book should be accessible to graduate students and research workers, both experimentalists and theorists, who have a good background in elementary statistical mechanics. We are well aware, however, that certain sections, notably in Chapters 4, 6, 9 and 12 require more concentration from the reader than others. Although the book is not intended to be exhaustive, we give many references to material that is not covered in depth in the text. Even at this level, it is impossible to include all the relevant work. Omissions may reflect our ignorance or a lack of good judgement, but we consider that our goal will have been achieved if the book serves as an introduction and guide to a continuously growing field.

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