

<<软物质物理导论>>

图书基本信息

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内容概要

This textbook was developed over a period of 10 years for the author's lecture on soft matter physics for both graduate and undergraduate students in the Physics Department of Fudan University. Soft matters are different from hard ones essentially due to their relatively weak interaction which is comparable to $k_B T_{\text{rm}}$ (T_{rm} = room temperature). It is this feature that results in the major characteristics of soft matters such as "strong reactions upon weak actions". This textbook not only concentrates on the basic interactions inside soft matters in a reductionist approach (Chap. 2, Chaps. 5 and 6), but also introduces the exploration works on the complexity of soft matters in methods of systems science (Chap. 4). Soft matters is a bridge between hard matters and complex systems that show characteristics of deterministic chaos in nature. As a "model animal" (a mouse, if you prefer) in soft matters, electrorheological (ER) fluids are introduced. While the properties and mechanisms of static ER effect are summarized (Chap. 5), this textbook puts its emphasis on the dynamic ER effects (Chap. 6). The Onsager principle of least energy dissipation rate is adapted in the textbook to see how it governs the optimal paths of a system's deviation from and restoration to equilibrium. As another model animal, granular media is introduced (Chap. 7) to explain the thermodynamics of sands and its dynamics such as compartmentalization, pattern formation, and granular flow. Since many soft matters consist of light atoms, neutron scattering appears useful as a powerful tool and is worth mentioning (Chap. 3), especially when a spallation neutron source is being erected in China. Soft matter physics is full of unknowns (Chap. 1) as the subject is still at its infancy, making it highly attractive. If you like a challenging subject, you will most certainly fall in love with soft matter physics at first sight!

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