Journal of Statistical Physics, Vol. 78, Nos. 3/4, 1995

Book Review: *Statistical Physics of Macromolecules*

Statistical Physics of Macromolecules. A. Yu. Grosberg and A. R. Khokhlov, American Institute of Physics, New York, 1994.

This is the first book in the new AIP series on polymers and complex materials (R. Larson and P. A. Pincus, eds.) and is a translation of the original 1989 Russian edition. It is supposed to fill the gap in the exposition of polymer physics by the three most influential schools usually associated with the names of P.-G. de Gennes, S. F. Edwards, and I. M. Lifshitz, the authors being two of Lifshitz's most reknowned students.

The table of contents is canonical except for the chapters and/or sections on polyelectrolytes, coil–globule transitions, liquid-crystal polymers, and biopolymers. The text is structured into sections that start with a short synopsis of the material. The authors stress the "absolute priority of physical understanding while still using advanced mathematics" and there is a lot of effort in the text to make the basic concepts and developments "physically transparent." Though the table of contents is canonical, there are many interesting and original twists to standard derivations interspersed throughout the book, which make it an interesting reading even for readers already familiar with the material. The work is conceived as a textbook on polymer physics and thus contains only the basic references, limiting itself to well-established results and derivations.

The formal level of the book is set by the method of self-consistent field theory and the scaling method. The renormalization group method is briefly touched upon, but does not enter the mainstream of the text at any point. Formally the book rarely wanders off from the graduate level and is basically self-contained.

Though there is no shortage of good textbooks in polymer physics, I would still recommend this book as a very appropriate postgraduate-level introductory text. I particularly enjoyed the sections being introduced with a short synopsis that puts the reader into the "right frame of mind" for subsequent, more detailed explanations and derivations. The mathematics is

822/78/3-4-33

transparent throughout the text and is always accompanied with sound and appropriate physical explanations. The only thing that I noticed was an occasional slightly awkward translation.

Rudolf Podgornik
Laboratory of Structural Biology
Division of Computer Research and Technology
National Institutes of Health
Bethesda, Maryland 20892