multiobjective concepts or methods applicable to their field of application. I shall find it a valuable reference in my own research.

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The Boundary Integral Equation Method in Axisymmetric Stress Analysis Problems. By A. A. BAKR. Springer-Verlag, Berlin, 1985. xii + 213 pp. $18.00, paper. ISBN 0-387-16030-2 (U.S.). Lecture Notes in Engineering, Vol. 14.

This softbound volume is number fourteen in a sequence of published notes in this series. As do the others, this volume combines a comprehensive mathematical discussion together with a broad range of application results and a comprehensive list of references. The presentation format, while cost effective, is of high quality and would appear to be quite durable.

The present volume is somewhat broader than indicated by the title. The material begins with the development of the potential theory problem before advancing to the elasticity problem. Body force problems associated with thermoelasticity and rotating bodies are also included. The final subject area involves fracture mechanics problems.

The analytical treatment of the boundary integral equation (BIE) for axisymmetric problems uses the axisymmetric fundamental solution, as well as rotationally integrating the three-dimensional fundamental solution. These two approaches are clearly shown to be fully equivalent, as expected. The formulation of the BIE relationships is clearly and thoroughly presented.

Numerical implementation of the BIE formulation is based on the use of quadratic isoparametric functions for the boundary data and boundary shape. The actual numerical integrations used follow traditional lines for two-dimensional problems. The axisymmetric kernel functions rely on various elliptic integrals; numerical evaluation procedures for these are also presented in detail.

Applications are varied and thoroughly documented. Comparisons are made to exact and numerical (finite difference or finite element) results, depending on the problem. No specific comparisons of computer time efficiencies are given. This reviewer was disappointed to see another BIE applications discussion using boundary meshes that look like finite element meshes. One of the notable attributes of the BIE method is the accuracy that can be achieved using boundary meshes that are quite a bit cruder than the needed finite element mesh along the surface.

These notes are very clear and complete. They are recommended to anyone interested in a thorough understanding of the axisymmetric BIE formulation, as well as some idea of its application potential.

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Entropy, Large Deviations, and Statistical Mechanics. By RICHARD S. ELLIS. Springer-Verlag, New York, 1985. xiv + 364 pp. $54.00. ISBN 0-387-96052-X. A Series of Comprehensive Studies in Mathematics, Vol. 271.

The purpose of this monograph is to give a connection between the more recent progress in the theory of large deviations and the basic notions in statistical mechanics. In the last decade, M. Donsker and S. Varadhan developed a theory of large deviations for Markov processes on three levels: the empirical mean, the empirical distribution and empirical stationary sequences. In each of these cases, the deviations from the ergodic law are measured by entropy functionals I_1, I_2 and I_3. They are coupled via a contraction principle which permits I_i to be expressed in terms of I_{i+1}. For the first time, the author systematically applies these three kinds of entropy functionals to the fundamental models of statistical mechanics.

In the first part of the book, the large deviation results and their applications to statistical mechanics are stated. Chapter 1 starts by explaining the three levels of large deviations for simple random variables, like those of the coin tossing process. The results are generalized to R^d-valued random variables in Chapter 2, whose normalized Laplace transforms are assumed to converge for level 1, and that are i.i.d. for levels 2 and 3. Varadhan's variational formula for the asymptotic expectations is given. These results are applied to basic models of statistical mechanics in the following three chapters. The simplest model is that of the discrete ideal gas without interaction. The notions and laws of classical thermodynamics are clarified by their large deviation counterparts, following the paper of O. E. Lanford (Lecture Notes in Physics, 20 (1973), pp. 1–113).

In Chapter 4, the existence of phase transitions for one-dimensional ferromagnetic models with Ising spins, including the Curie–Weiss model, is discussed. The uniqueness of the Gibbs state is established for the noncritical region ($\beta<\beta_c$ or $h\neq 0$). Phase transitions for higher-dimensional ferromagnetic models are proved in Part I of Chapter 5 via Peierls' argument. The central limit theorem is shown to hold for these models as long as the susceptibility stays finite. At the critical point, the Buckingham–Gunton inequality for the critical exponents and the breakdown of the central limit theorem are derived. The review of the Curie–Weiss model and the mean-field circle model with its transition to magnetic wave functions conclude these applications.

The second part of the book gives the necessary more technical results on convex functions, Legendre transforms and theorems on large deviations. Except for level 1, the proofs are restricted to i.i.d. random variables with finite state space. Only for the one-dimensional models is the variational principle derived via large deviation methods; in higher dimensions the author follows the proofs of Dobrushin–Lanford–Ruelle–Föllmer.

The book is well organized and precisely written. It contains many notes, historical remarks, problems and suggestions for further reading. The list of references is extensive. It would be very well suited as a course book for an introduction to the mathematical methods of statistical mechanics.

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Statistical Inference Based on Ranks. By THOMAS P. HETTMANSPERGER. John Wiley, New York, 1984. xx + 323 pp. $37.50. ISBN 0-471-88474-X. A volume in the Wiley Series in Probability and Mathematical Statistics.

There are now some twenty books on nonparametric statistics, but this is the first that systematically treats the linear model. There is a promise in the Preface that soon there will be software for implementing these methods. The book deals also with the one-sample location model for arbitrary continuous distributions and for symmetric ones, the two-sample location model, one-way and two-way layouts and rank correlation, and the multivariate location model.

Inference based on ranks is one of the most important practical developments in statistics during the last forty years because it is almost as efficient as standard methods based on Gaussian assumptions even when these assumptions are valid, and is more