E. F. NOGOTOV, **Applications of Numerical Heat Transfer.** (B. M. BERKOVSKY, Editor, and W. J. MINKOWYCZ, Consulting Editor). Hemisphere, 1978. 133 pp.

THIS brief book is based on lectures delivered by the author in 1974. The preface promises that "Engineers working in the energy field,..., will find in these pages the information they need for the employment of modern numerical methods in their daily practice" and that a "complete and systematic treatment of the subject, from basic concepts of finite-difference methods to sophisticated finite-difference schemes, is provided in this work". There are three major sections in which the author tries to fulfill these promises.

The first major section (49 pp) mainly discusses the formulation of the finite difference equations and presents some methods for the analysis of stability. The second section (31 pp.) examines several different extensions and refinements to finite difference methods applied to problems in transient heat conduction. The final major section (also 31 pp.) is devoted to a discussion of convective heat transfer; the main focus is on the vorticity stream function formulation.

Who would find this book particularly helpful? Because both the scope and depth of the material are limited, the answer is most likely to be students being introduced, for the first time, to finite-difference methods. But it is not really well suited to this audience since no problems are presented, and because changes in nomenclature and errors in printing would lead to confusion. In addition, most students would require more information on methods of solving problems involving fluid flow. Finally, engineering students would find frustrating the failure to present the motivation underlying some of the methods.

The more advanced student, or practising engineer, may find some of the sections of the book of interest, but the scope is too narrow to be attractive to most. In addition to the lack of attention to fluid flow applications already mentioned, the treatment of irregular geometries is not discussed, and few (23) references are cited.

It is the opinion of this reviewer that the book does not live up to the promises in the preface.

G. D. RAITHBY

B. BERKOVSKY (Editor), **Thermomechanics of Magnetic Fluids.** Hemisphere, Washington, DC (1980). 318 pp.

THIS book contains the proceedings of the International Advanced Course and Workshop on Thermomechanics of Magnetic Fluids which took place in October 1977, and which was the first such international conference.

For the uninitiated, a magnetic fluid consists of a colloidal suspension of ferromagnetic grains present in a host liquid which is usually non-magnetic and non-conducting, and often water based. Because it is strongly magnetizable, and is a fluid, it is a promising material for which numerous applications have been found and are being sought.

The book contains eighteen papers, grouped as follows. The first two deal with the preparation of magnetic fluids, and discuss the parameters which affect and determine their stability. The next seven papers describe the behaviour and properties of various magnetic fluids. There follow five papers dealing with theoretical aspects. The final four papers are concerned primarily with applications.

The applications of magnetic fluids both actual and proposed are wide-ranging and fascinating, for example: ink jet printing wherein fluid droplets are suitably directed by application of intense magnetic fields of short duration; and spindles, for use in textile machinery, which do not wear and are not noisy because they are magnetically levitated.

The theorists have a strenuous task in merely writing down the governing equations, let alone in solving them. An especially interesting feature from the theoretical point of view is the presence of magnetic body couples, which for their description require the consideration of the rotary degrees of freedom, in addition to the linear ones usually considered. The thermal reference in the book's title is mainly connected with the effect of molecular vibration on the rigidity with which the magnetic domains are fixed in the magnetic grains, for this determines the suitability of the Langevin theory on Weiss theory for the description of the dependence of magnetization on the applied field.

The book contains a well-balanced set of papers, which will serve to introduce the subject to newcomers, and for the initiated it illustrates the state-of-the-art with numerous references to the literature.

H. ROSTEN