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# REVIEWS

**Mechanics of Sediment Transport.** Edited by B. M. SUMER & A. MULLER. Balkema, 1983. 296 pp. £25.

This book consists of the proceedings of the Euromech Colloquium 156 held in Istanbul in July 1982. Forty-one papers were presented by researchers from twelve different countries.

Like other subjects, sediment transport has its fashions. In the 1950s and 1960s the mode was for elaborate models and all-purpose formulae which allowed the sediment transport rate to be calculated at one bound. None of these major hold-all formulae has proved entirely satisfactory. It would seem that the fluid/sediment interactions are more complex than had been supposed and that detailed study of the basic mechanisms will be necessary if further progress is to be made. The papers in this volume reflect this change in emphasis. Most of them are devoted to investigation of the basic mechanisms – which is probably good news for readers of JFM – and none to the mindless pursuit of correlations, however implausible. The editors have grouped the papers into six sections.

The starting point for any investigation of sediment transport must be a study of the velocity of the fluid itself. This aspect is covered in Section 1. An interesting survey paper by Grass outlines existing knowledge of boundary-layer turbulence and, particularly, the bursting phenomenon and associated coherent flow structures which are believed to provide the primary mechanism for sediment suspension. These and related topics are further developed in papers by Anwar & Atkins, Browand *et al.* and Muller & Gyr. The resulting boundary shear stress is considered by Knight *et al.*

Once the fluid velocity distribution has been determined, the next step is to study how the grains of sediment will move. This is the subject of Section 2. Three papers on the wind-driven motion of sediment particles by Salaun-Penquer *et al.*, Barndorff-Nielsen *et al.* and Jensen & Sorensen are followed by three papers on fluid forces on individual grains and their consequent displacements by Hille *et al.*, Feuillebois *et al.* and Murphy.

The formation and behaviour of ripples and dunes is discussed in Section 3. The nine papers in this section range from the analytical models of Fredsoe, Sumer *et al.*, de Jong and Richards to the mainly experimental results of Van Rijn, Ribberink and Van Urk.

Section 4 deals with sediment transport in suspension. Experimental results are presented by Petkovic & Bouvard and Wan while analytical or numerical models are put forward by Bechteler & Farber, Cellik and Bechteler & Schrimpf.

Sections 5 and 6 contain the remainder of the papers. Bayazit, Bathurst *et al.* and Ergenzinger & Custer are concerned with various aspects of sediment transport in steep channels. Deigard and Bettess consider grain size sorting and river-bed degradation, Oebius describes a bed shear-stress measuring device and Sert, Ozhan, Quick and McDowell consider problems in which wave action is important.

It will be clear from this brief survey that the papers collected in this volume cover a wide range of interesting topics. As might be expected with papers presented to a Euromech colloquium, a high level of background knowledge is assumed. This is not, therefore, a book for the newcomer to the subject. However, the generally good standard of the papers should make it essential reading for all those who are already working in the field of sediment transport.

J. F. A. SLEATH

**Solar Heating and Cooling: Active and Passive Design, 2nd edn.** By JAN F. KRIEDER and FRANK KREITH. Hemisphere, 1982. 479 pp., £27.95.

Interest in subjects related to the utilization of solar energy is in a state of continuous fluctuation, depending on oil crises, public opinion on ecological problems, political clashes, etc. During the last three decades there have been several extreme peaks of interest in solar energy and correspondingly in research and engineering activities in the field. These peaks have been interspersed by periods of deep recession. The high point indubitably occurred in the mid-seventies, and at present we are still in the tail of the 'boom', although it is now gradually decaying as oil prices decline. All disappointments with solar energy have been based on the simple fact that it is a very dispersed kind of energy and it is expensive to concentrate and collect it. However, regardless of the instantaneous ups and downs, if one takes a long-range view and tries to analyse the situation in historical perspective, it becomes clear that both solar science and solar technology are making permanent and confident progress. Solar heating and cooling is an existing reality in many areas of the world, in some countries on a nationwide scale (solar electricity, on the other hand, is still in the laboratory cradle).

The first edition of Kreider and Kreith's book appeared during the peak in solar activity. The second, revised and supplemented edition has been printed now, during the recession. How soon the need for a third edition becomes acute will depend on how events develop. There is, however, no question that the present edition is timely and that it will find a broad audience of interested readers – engineers and technicians involved in the design and construction of solar installations for heating and cooling, as well as laymen.

So much about the subject and timing of the book and its probable audience. In approach and style, the book is notable for its outstandingly simple narrative, with some elementary insight into the physics of the processes, and its clear presentation of the most recent and practical calculation and design methods. All the cumbersome theories and deductions between these extremes have been omitted. Their approach has permitted the authors to produce a kind of encyclopedia (or at least a handbook) of solar heating and cooling, but, unlike an encyclopedia, where only very general and superficial information is given, this book also presents the practical details necessary for preliminary calculations and engineering assessment. The large number of practical recommendations, and the tables presenting rich practical experience in a generalized form, are also very valuable, as are the examples of calculations with full solutions. All this is condensed into a single volume of reasonable size. The authors' approach is probably best expressed in the epigraph to the first edition, taken from Norman Cousins: 'One of the great maladies of our time is the way sophistication seems to be valued above common sense.'

It should be made clear that, while this book is an excellent introduction to the field of solar heating and cooling and gives the necessary information for evaluation and assessment, it does not provide the reader with the means for either detailed design or research. In many places the authors refer to difficult texts and monographs for more detailed information.

The main topics included in the book are as follows: chapter 1 gives an overview of solar energy problems and of solar technologies; chapter 2 explains solar radiation calculations; chapters 3, 4 and 5 describe methods and means for collecting and storing solar heat. In the last of these chapters, great attention is given to the economic aspects. The next four chapters (6–9) treat the problems of solar water

heating, passive space heating, active heating and solar cooling, mainly by use of compression and absorption air-conditioning systems. Special topics are considered in chapter 10, where one can find such diverse items as photovoltaics and solar ponds. This reviewer was amazed to see the title 'Wood Stoves' included; it turns out that the 'design of these devices has been, and still is, more of an art than a science'. The few pages dedicated to the subject in Kreider and Kreith's book do not transform it into science, but they at least make it clear how little we know about this more than classical device. Chapter 11 concludes the book by giving quite basic information on state approaches to solar legislation. There are twelve appendices containing different kinds of important data for calculations.

In summary, this book is a valuable contribution to the literature on solar energy, and it will be very useful to all those who are looking for an easy introduction to the field of solar heating and cooling that is both well-grounded in science and technology and practically oriented.

H. BRANOVER

## CORRIGENDUM

Stratified flow over three-dimensional ridges

By I. P. CASTRO, W. H. SNYDER AND G. L. MARSH

*Journal of Fluid Mechanics*, vol. 135, 1983, pp. 261–282

Owing to an error at the printers, the colour photograph (figure 17, facing p. 282) has been reproduced back to front. The caption should therefore read:

'...The body is moving from left to right and is some way to the right of the right-hand margin...'

Readers familiar with the Kármán vortex street, or the well-known satellite photographs of vortex shedding behind Jan Mayen Island will already have deduced the error!