

REVIEWS

Fundamentals of Temperature, Pressure and Flow Measurements, 2nd edition. By R. P. BENEDICT. Wiley, 1977. 517 pp. £22.50 or \$38.00.

Laser Systems in Flow Measurements. By T. S. DURANNI and C. A. GREATED. Plenum Press, 1977. 289 pp. \$27.50.

The common theme of these two books is 'measurement' but the first is concerned with a range of well-established techniques and the second with a single, more recent and less established method. Both books are useful and timely but are very different in their aims and format.

The combination of temperature, pressure and flow measurements is not uncommon in books on experimentation and Professor Benedict's book was first published in 1969. It is concerned, almost entirely, with steady-state measurements and, where transient response is introduced, is not seriously concerned with turbulent-flow measurements. This second edition has been brought up to date mainly by the introduction of new codes of practice, for example, the International Practical Temperature Scale and ASME Discharge Coefficients, and by a new chapter on error sources. Perhaps more relevant to readers of this journal is the new material relating to pressure-tap errors, probe-blockage effects and probe performance in pressure gradients; none of this material is new but it is useful to have it collected in a single chapter.

There is no doubt that books describing a range of measurement techniques sell and are used. The lack of new material or new ideas implies, however, that the book will be regarded as a compendium of known facts and it does not make exciting reading. It is also true that experimenters must be informed of all the relevant details and possible error sources for established techniques, but it would also be an advantage for them to be introduced to more recently developed methods of measurement or even to techniques which will measure the properties discussed in the book and much more. In this last context, there is no mention of hot-wire anemometry and in the former, laser-Doppler anemometry and spectroscopy are not mentioned.

The book by Dr Durrani and Dr Greated is a complete contrast to that of Professor Benedict. The subject of laser-Doppler anemometry, on which this book concentrates, is relatively new and the first related texts emerged during 1976 and 1977. The authors do not set about trying to provide a compendium of information but rather to explain, with the use of some mathematics, the principles of relevant optical systems, of frequency- and time-domain signal analysis and of photon correlation methods. Hardware systems are discussed in a separate chapter with the substantially theoretical flavour sustained. The book deals with these topics in an individual and helpful manner. An important criticism of the book however is that it is unlikely to direct a potential user to a correct choice of a measurement system and its successful application to fluid-dynamic measurements. Of course, and this has been hinted at in connexion with the previous book, a book of recipes for precise measurements can make dull reading. There is, however, middle ground and the present text will undoubtedly help the theoretical understanding of laser-Doppler anemometry but

leaves the reader with a great deal of work to do before he can undertake measurements with confidence.

The sections on photon correlation and cross-correlation techniques (as applied to velocity measurement) are new to textbook literature and very timely. Photon correlation still remains, at least for precise turbulence measurements, a relatively unproven technique and, although it is a rapidly moving topic, it is very welcome to see it presented and discussed in book form.

The possible and likely precision of measurements is not discussed except in passing and this omission is to be regretted. The uncertainties associated with different forms of signal analysis need to be quantified, partly by analysis and partly by comparison with 'known' results in order to provide support for potential users. This approach has not been adopted in any part of the book and the reader new to the topic is, as a result, left with incomplete information to allow a comparative assessment of different forms of signal processing or, indeed, to compare laser-Doppler anemometry with the standard probe methods discussed by Professor Benedict. The book may be compared with those of Durst, Melling & Whitelaw (Academic Press, 1976) and Watrasiewicz & Rudd (Butterworths, 1976) and this is facilitated by the review of Dr A. Smart (*J. Fluid Mech.* vol. 80, 1977, p. 204). The purposes and achievements of the three books are different and each has advantages.

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