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Book Review

Fluid Mechanics Measurements, Second Edition

Edited by R. J. Goldstein, Taylor and Francis, Bristol, PA, 1996, 712 pp., $79.95

I was pleased to review for the *AIAA Journal* the first edition of this book when it came out under the Hemisphere imprint, and I looked forward to reviewing the second edition, this time through Taylor and Francis. It proved to be a somewhat mixed experience. I strongly recommended the first edition as a comprehensive introduction to measurement techniques in fluid mechanics, particularly for students and others starting in the field. It provided a good mix of background material in fluid mechanics and the science of measurement, along with authoritative treatments of a wide variety of commonly used experimental methods. A lot has happened in the measurement area during the intervening 13 years, but unfortunately the second edition falls considerably short of addressing these developments. This book is still an essential reference, and it ought to be prominently present in all graduate fluid mechanics laboratories, but some important material has been cut in the second edition, while many newer techniques and methods are not considered. Two chapters from the first edition, dealing with differential pressure measurement and two-phase flow measurement techniques, have been cut, despite the obvious importance of these topics in general fluid mechanics. As for newer methods, I found the lack of discussion of image-based methods particularly disappointing, and very little space is devoted to the treatment and processing of image-based data or the handling of three-dimensional data sets in general. On the more positive side, the chapter on physical laws of fluid mechanics and their application to measurement techniques and the chapter on laser-Doppler velocimetry have been substantially revised and updated (these two chapters were highlights of the first edition and still represent the book at its best), and a new chapter on acquiring and processing turbulent flow data has been added. Unfortunately, this new chapter falls far short of its potential, and it is no more than a somewhat mixed collection of previously available material. What is particularly puzzling is the space given over to analog techniques. Although some treatment of signal preconditioning is undoubtedly useful, analog methods in turbulence are severely out of date. Since the chapter seems to be aimed at newcomers to the area, I doubt if anyone starting out would use anything but digital methods for acquiring and processing data.

Some minor sins of omission and commission are also irritating. For example, Proper Orthogonal Decomposition could not be found in the index, despite the fact that its consideration was cited in the preface as an indication of how the second edition differs from the first. In the chapter on wall stress measurement, the sections on oil film techniques and pulsed-wall probes are very cursory and do not reflect the growing impact of their use. But I do not want to be too negative. As an introduction to measurement techniques in fluid mechanics, this volume is invaluable, and it should be required reading for all graduate students in experimental fluid mechanics.

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