

appropriate, for subsequent inclusion in the corresponding volumes. For example, this reviewer believes that a 'revolution' (again in the sense of Kuhn) is imminent in fluid mechanics research methodology and that it will come with the use of computers as tools for the *synergistic* experimental and numerical simulation of turbulent fluid mechanics phenomena. The multiprocessing and massive parallel computing characteristics of new computers makes it possible to conceive of this. The potential for very fast exchanges of large amounts of information between the experimental and numerical data bases corresponding to a given flow opens up an entirely new era of real-time, interactive, research methodology in turbulence.

The conclusion of this point is that, in the interest of maintaining the usefulness and maximizing the impact of future symposia and their volumes, more attention must be given by the symposia organizers and the volume editors to providing guidance on specific significant issues, as opposed simply to subject areas, which will lead to new concepts and paradigms in turbulence.

Handbook of Hydraulic Resistance

I. E. Idelchik

This should be a very useful book for engineers designing flow circuits for laboratory or field. It deals primarily with closed conduits and the emphasis is on incompressible flows.

An introductory chapter on hydraulic principles is followed by eleven chapters on various categories of head losses. The first of these is on friction loss in uniform conduits, while the subsequent ten chapters deal with specific types of local departure from uniform flow. These cover, in order: entrance losses; orifices and abrupt enlargements or contractions; gradual changes, eg, diffusers; elbows and bends; merging and division, eg, wyes and tees; grids, screens, packings, etc; valves and seals; obstructions in the conduit, eg, rods, structural elements; exit losses; and finally, flow through specific pieces of apparatus, eg, scrubbers, cyclones.

Each of the above chapters starts with a section of text which gives explanations and recommendations. This is followed by a section of curves and charts which organize and tabulate much of the foregoing information. A list of references concludes each chapter; about two-thirds of them are from the Russian literature. The chapters provide an impressive compendium of information garnered from this material; to pick an arbitrary example from the section on elbows, at least eight

Fluid Mechanics Measurements

R. J. Goldstein

A book which addresses not only the conceptual aspects of measurements in the area of fluid mechanics but also practical features of their implementation is particularly welcome. The work addressed herein does just that, and in an admirable fashion that includes a comprehensive overview of a wide range of topics.

The section on differential pressure measurements includes consideration of both mean, and most importantly, fluctuating pressure. The topics of thermal and laser anemometry are addressed in considerable detail. Methods of flow visualization include direct injection techniques, as well as more sophisticated optical arrangements involving shadowgraph, Schlieren and interferometric techniques. Moreover, there is a very substantial section on measurement of wall shear stress.

The book is by no means limited to measurement techniques in single phase, Newtonian fluids, as evidenced by substantial coverage of techniques applicable to non-Newtonian and two-

Second is the observation that while the symposia volumes have served as a permanent depository for new and valuable experimental and numerical data, this is by necessity limited and inconvenient to use. The editors should consider establishing a bank of critically reviewed data of permanent value to the fluid mechanics community which is readily accessible via one or more computer networks. This is, of course, much more easily suggested than accomplished in practice! Perhaps a solution lies in pooling resources with other organizations, such as AIAA, APS, ASME, etc., having similar interests and needs.

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configurations of segmented circular elbows alone are presented. Obviously all possible situations cannot be covered, but it is felt that the information provided, together with the principles described, may assist the user in making estimates for other cases.

Considering the amount of material included, the book is reasonably convenient to use. Reference to the text may be necessary to properly interpret some of the summary curves. The translation is generally good and the textual material flows smoothly. A few interpretations may be unfamiliar to readers at first, but not so as to hamper understanding. An example is 'stabilized' pipe flow, which apparently means fully developed uniform flow. In summary, the handbook is recommended for design engineers.

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phase flows. Finally, the practising engineer will benefit greatly from the section on volume flow measurements.

All in all, this reviewer found the presentation of material to be lucid and easily approachable, a tribute to both the authors and the editor. It will be useful to the spectrum of workers in this field, ranging from those concerned with basic research to engineers involved with practical design.

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