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Book review

MEASUREMENTS IN FLUID MECHANICS
S. Tavoularis. Cambridge University Press, 2005.
ISBN-13 978 0 5218 1518 5, ISBN-10 0 5218 1518 5, £45, 354 pp.

Measurements in Fluid Mechanics contains a balanced mix of both theoretical and practical information that enables the reader to gain a healthy appreciation of this engineering discipline. The book also provides an unexpected, yet refreshing, mixture of fundamental electrical and electronic information as well as some background in physics. As the title implies, *Measurements in Fluid Mechanics* discusses methods for applying this engineering knowledge using 'time-tested sound practices' to produce measurement results that are both practicable and reliable.

Although much of the text deals with general concepts, the author manages to express the need to look at the practical issues associated with measuring fluids in 'real world' situations. The following quotation from the book encapsulates the practical approach taken to control and monitoring system design.

> 'Although accurate mathematical models of fluid flow are available, it is generally advisable, and even necessary, to employ simplifications whenever possible and to the greatest possible extent.... As a rule, one should strive to use the simplest possible analytical model that permits the desired measurement with acceptable uncertainty.'

Part One of the book discusses general concepts including the physical aspects of fluids and various measurement principles. These measuring principles include electrical circuit theory and signal conditioning as well as the nature of light and light propagation through media. Conventions for estimating and presenting results for measurement errors and uncertainties are presented in Chapter 3. Useful guidelines for carrying out successful experiments are provided in Chapter 7.

Part Two of the book covers measurement techniques. Methods used for measuring fluid flow pressure, flow rate and flow velocity are presented. Current interests in the use of flow visualisation (providing a qualitative look at fluid flow characteristics) are highlighted. Techniques used for the most popular methods of flow visualisation are outlined. The measurement of temperature, including various temperature measuring devices, is discussed. The final chapters of the book cover the measurement of fluid composition and the measurement of wall shear stress (the local tangential force by the fluid on a surface in contact with it).

Chapters conclude with a number of exercises and problems that allow the reader to apply the information and knowledge learned from the text. Where in-depth interest of a specific topic is likely, the author provides references to relevant publications.

I have no doubt that this textbook will prove very valuable as a reference, particularly the section on estimating measurement uncertainty and the section defining flow measurement techniques. My interest in this book is perhaps rather selfish due to its peculiar match to much of the work with which I am involved, but I consider that the contents will also prove useful to the larger engineering community.

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