the aerodynamic design of the stationary low pressure components, including the turbine inlet section and the exhaust system, as well as the condenser. These components are often designed more on the basis of test data and art rather than on theoretical considerations.

Although there are other books which address various aerothermodynamic problems encountered in the design of low pressure steam turbines and condensers, this is one of the few books available which puts virtually all aspects together under one cover. This book is a very good state-of-the-art review and should be a welcome source of information for any researcher or designer working in the area.

K. E. Robbins

Instrumentation for complex fluid flows

Nicholas P. Cheremisinoff
Technomic, Lancaster, Pennsylvania, 1986, 374 pp., $49

This book is addressed primarily to graduate research students and laboratory researchers in the fields of aeronautics, chemical, civil, and mechanical engineering and geophysical fluids mechanics. The level of the book is that of a survey, with many laboratory methods for the quantitative measurements of fluid flow being described at an introductory level. The author is particularly interested in methods for measurements of turbulence and two-phase flows and certain interfacial flow phenomena. The book also discusses signal processing and laboratory automation in chapters that supplement the main topic of sensor techniques for measurement of fluid velocity, particle size and motion, and interface motion.

The level of detail is sufficient to introduce the basic principles of the instruments and the breadth of coverage is quite good. The book does not, however, go into detail enough to acquaint the reader with an intimate knowledge of the techniques. Moreover, there are often fundamental errors in statements which could be very misleading; for example, descriptions of certain phenomena sometimes indicate trends exactly opposite to those that are known to occur. These mistakes may cause an unfamiliar reader great difficulty. The reader would be well-advised to use the book primarily as an introductory survey to become acquainted with many different types of measurement techniques, and pursue details of these techniques from other sources. Despite the errors, the book is worth having on one's shelf.

R. J. Adrian

The chemical engineering guide to heat transfer, volumes 1 and 2

Edited by Kenneth J. McNaughton
Hemisphere Publishing, vol. 1: 362 pp., $49.95; vol. 2: 300 pp., $49.50

This two-volume set is a collection of reprints from *Chemical Engineering*. The reprinted articles date from 1979 to 1985, and cover a very wide range of heat transfer topics including basic equipment such as fired heaters, boilers, refrigeration systems, cooling towers, agitated vessels, and dryers. More exotic subjects addressed include heat pipes, hydraulic turbines, solar ponds, and microwave dryers. There are also topics which some heat transfer engineers might regard as "gatecrashers," namely steam traps, steam tracing, and insulation.

The main emphasis, however, is on heat exchangers and, especially, shell and hube heat exchangers.

The two substantial, well-printed, solidly bound, quarto-sized volumes are entitled respectively "Plant Principles" and "Equipment," titles which are rather vague and, as it turns out, somewhat irrelevant as regards the contents. Classifying such a large and diverse range of articles must be quite a difficult task, but classify them the editor does, fairly successfully, under six headings in each volume: Heat Exchangers, Shell & Tube Equipment, Design, Heat Recovery, Steam, and Cost in volume 2; Boilers, Cooling, Heating & Insulation, Condensers, Dryers, and Other Equipment in volume 2.

Those familiar with *Chemical Engineering* will know that it specializes in articles of an intensively practical nature written by practicing engineers who are anxious to share many years of hard work and often painful, experience with colleagues. Prospective readers looking for good heat transfer science will, therefore, be disappointed. Indeed, the articles in this collection which fall down flattest are those where the authors are attempting to be at their most scientific. For example, several articles on calculating multipass log mean temperature differences are largely taken up by the tedious algebra found in many standard texts.

Sympathy, however, must be extended to the many Hewlett Packard HP-67 buffs contributing to the book who labored long and hard, programming thermal design methods from Kern and others, only to find their efforts overtaken by the mid-eighties generation of personal computers and associated sophisticated software.

Where the books really do score, however, is in the collected experience of specialists who, over the years, have had to select, design, buy, construct, operate, and troubleshoot all kinds of heat exchangers and other equipment. Much of this hands-on experience is never put in writing except in magazine articles, and is unlikely to be found in the more academic texts.

Also hard to find elsewhere, and very useful, are the articles on cost estimation. Although the information contained in these is now a few years out of date, the application of a judicious factor to account for recent, mercifully small, rises in costs should render these estimation methods still very helpful.

This set is, then, very much for the practicing engineer in the oil and gas industry, and probably more for the operating company generalist rather than the contracting/manufacturing specialist.

C. Norman