BOOKS

Turbulence Measurements in Liquids, Proceedings of the Symposium on Turbulence Measurement in Liquids—University of Missouri, Rolla (September, 1969). G. K. Patterson and J. L. Zakin, (eds.), 1971. 155 pages. $8.00.

The proceedings are logically organized into four sections describing the experimental techniques involving optical and probe devices, the measurements as applied to Newtonian liquids, to two-phase flow systems, to polymer containing systems, and to special flow situations. This format is very useful as a guide to the state-of-the-art for chemical engineers active in the field as well as those trying to keep current. For the busy professional in industry the foreward will be one of the most important contributions of this volume.

The significant points that emerge as this field rapidly grows and develops are that the hot-film anemometer probes have now reached the threshold of becoming an important tool in turbulence work, even competing in some cases with the old classic—the hot wire. The laser-doppler velocimeter, although restricted in its use to transparent low velocity systems, is an important tool when there is a special constraint of not disturbing the flow field. The probes based on the electrochemical analog are a practical tool for studying wall turbulence phenomena in clean systems. I think the volume does give a misleading impression that pressure probes are becoming less popular and more limited in their use. In the process industries, however, where highly quantitative interpretation is not required, they are continually and very extensively used.

A true test of the relevance of this volume to practicing chemical engineers busy grappling with the needs of society is whether any part of this volume can find immediate application. Before I was half way through this volume, I found results that were of immediate use in our current Shell work, and action was taken before I resumed reading the rest of the proceedings.

To researchers active in this and related fields a number of conclusions will be of particular value. In two-phase flow work the hot film sensor is useful through its transient response to a dispersed second phase, like gas bubbles. In stirred vessel turbulence measurements one must be particularly careful to establish the velocity vector direction first before quantitatively determining the turbulence components relative to vessel coordinates. Also in stirred vessels there are large corrections to pitot tube measurements owing to high turbulence levels, and that when relative turbulence levels become as high as 50% they begin to lose their meaning as turbulence in the classical sense and take on the character of transient flow as a result of blade passage. In understanding the role of drag reducing polymers, the molecular chains act to reduce the energy density of the turbulence spectra over all frequencies and every position in internal and external flows.

Every chemical engineer will find something here of help and of interest to him in his work. This volume certainly will encourage the use of hot-film sensors in new and increasingly challenging problems involving liquid turbulence.

T. R. Galloway
Shell Development Company
Emeryville, California 94608

Chemical Plant Simulation, C. M. Crowe, A. E. Hamielec, T. W. Hoffman, A. I. Johnson, P. T. Shannon, D. R. Woods, Prentice Hall, Englewood Cliffs, N.J., (1971). 368 pages. $16.95.

The purpose of this book is to demonstrate the strategy and technical difficulties involved in computer studies of large chemical processes with a detailed account of a case study conducted by a group of faculty and students at McMaster University using the PACER executive program and an industrial sulphuric acid plant as a candidate for study. Since PACER is proprietary (Digital Systems Corp., Hanover, New Hampshire), the book does not provide the listing for the program and only a few of the algorithms for the unit processes are demonstrated. PACER is one of a class of programs used for the calculation of steady state energy and material balances for chemical processes, a common procedure in industry used for the design and expansion of plants; consequently, the study described in the book is typical of the work done in industry. Exposing senior students to the complexities typical in industry certainly has merit, but whether this makes optimum use of educational time is debatable.

Considerable detail is provided on the analysis of the sulphuric acid plant and on procedures for obtaining the basic data of the chemical components involved. There is also a clear explanation of the structure and use of the PACER program. In general, the book would be useful in providing ideas and guidance to students and engineers in industry who are conducting computer simulations. It will be particularly valuable, however, to those using the PACER program for their simulations.

R. G. E. Franks
E. I. du Pont de Nemours & Co.
Wilmington, Delaware 19898

Polymer Science and Engineering, David J. Williams, Prentice-Hall, Inc., Englewood Cliffs, N.J. (1971). 401 pages. $17.00

The field of polymer science and engineering has been fortunate with the advent of three new books suitable as senior or graduate texts as well as for