Book Review

Measurement of Two-Phase Flow Parameters. By G. W. Hewitt. Academic Press Inc. (London) Ltd. (1978). 287 pp. $22.50.

This book, *Measurement of Two-Phase Flow Parameters*, by G. F. Hewitt, is a welcome addition to the archival literature. Hewitt has a great wealth of experience in the field of two-phase flow measurement. In his recent book, he attempts to share his experience with designers and researchers in the field.

This book grew out of an invited lecture given by its author at an International Symposium on Two-Phase Flow in Haifa, Israel (1971). In this lecture, Hewitt attempted to classify the available two-phase flow instrumentation in terms of the parameters to be measured. This system of classification has been continued, and refined, in his book. The intent is to make it a valuable reference for the designer of two-phase flow equipment, as well as for the researcher.

The first chapter gives a brief introduction to two-phase flow and boiling phenomena. The subsequent six chapters present a literature survey of the various instrumentation available for the measurement of important parameters in two-phase flow. The classification is done in terms of

1. primary design parameters
2. secondary design parameters
3. third-order parameters.

Two chapters are concerned with the measurement of such primary design parameters as pressure drop, void fraction, and critical heat flux. Surprisingly, system flow rate is considered to be a secondary design parameter and is thus treated in a subsequent chapter.

The next two chapters are devoted to secondary design and so-called second-order parameters. Such topics as liquid level detection, quality and mass flow measurement, flow pattern detection, and liquid entrainment and film thickness measurement techniques are treated. It seemed to this reviewer that the method of classification chosen made the grouping of measurement techniques somewhat awkward, and that classification according to type of measurement technique (i.e., local or global, intrusive or not, electrical, optical, etc.) would have been preferable.

While one can raise questions concerning the relative merits of the various possible classification system, there is no question that Hewitt has presented an excellent state-of-the-art review of available two-phase flow instrumentation. In particular, the coverage of optical techniques (an area in which Hewitt has specialized) is outstanding.

The final two chapters are concerned with the measurement of third-order parameters (e.g., velocity, temperature, and pressure fluctuations) and fluid-to-fluid scaling. The chapter on scaling is primarily concerned with the analytical basis of fluid-to-fluid modeling and thus seems a bit out of place in a book on instrumentation. Nevertheless, it is valuable in its own right and should be of interest to the experimentalists who are concerned with measurements in two-phase flow.

Any serious worker in the field of two-phase flow should have a copy of this book in his library. Hewitt has collected together and distilled a large number of valuable references on two-phase flow measurement techniques. This book can serve as the basis for educating newcomers to the field and as a convenient reference manual for peers.

Anyone who has ever tried to capture the state-of-the-art in a field that is as rapidly changing as two-phase flow instrumentation will recognize and appreciate Hewitt's fine piece of work. I recommend it to all American Nuclear Society members who have an interest in this aspect of nuclear engineering.

R. T. Lahey, Jr.

Rensselaer Polytechnic Institute
Troy, New York 12181

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About the Reviewer: R. T. Lahey, Jr. has been chairman of the Department of Nuclear Engineering at Rensselaer Polytechnic Institute (RPI) since 1975. This academic experience follows an extended association with the General Electric Company, both at Knolls Atomic Power Laboratory and in San Jose, where he was engaged in thermohydraulic research. Dr. Lahey's graduate studies were at RPI, Columbia, and Stanford.