

## INTRODUCTORY REMARKS

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Since the first in its series of triennial conferences, the Iowa Institute has selected for each successive meeting a specific technical theme. The second, in 1942, stressed the similarities in the problems of different professions dealing with fluid motion; the third—postponed till 1946 because of the war—dealt with peacetime applications of wartime research; the fourth, held in 1949, involved the compilation of a reference book on engineering hydraulics; and the fifth, three years thereafter, was devoted to the transportation of sediment. In keeping with this policy, the theme of the Sixth Hydraulics Conference was chosen to be the measurement of fluid flow.

This theme seemed appropriate for two reasons. On the one hand, the previous one and one-half decades had witnessed vast changes in the various techniques of measurement, nearly all of which had incorporated one form or another of electronic gadgetry. New means were thus available for the measurement of depth, velocity, rate of flow, pressure, and shear—whether as mean or as fluctuating quantities. In addition, electrical methods of recording the signals, and of analyzing the records statistically, had been brought to a state of considerable refinement. On the other hand, the same period had also realized great advances in the theoretical analysis of fluid motion, and it seemed timely to assess the role of science in the art of measurement, and as well the relationship of measurement to analysis itself.

In the early days of hydraulics all accomplishment was necessarily empirical, and one heritage of this period in history that persisted well into the present century was the belief that any phenomenon of flow could be understood if only sufficient experimental data were obtained. While this may be true in the limit, it is hardly conducive to efficiency in research, in particular since emphasis is placed upon the quantity at the expense of the quality of the measurements. Fortunately, as the art and the science have progressed, they have had a most salutary reciprocal effect. Improve-

ment in the mechanical aspects of measuring techniques has been paralleled by their more intelligent application in accordance with the dictates of theory. Analysis, in turn, has become increasingly subject not only to experimental verification and subsequent amplification, but as well to experimental guidance at frequent intermediate stages. No longer, in a word, is either considered sufficient unto itself.

A program of fourteen invited papers on the theme of flow measurement was arranged for the Sixth Hydraulics Conference, each of the speakers selected being not only a specialist in his field but also new to the cumulative program roster. Twelve of the papers dealt with particular aspects of instrumentation, and most of these pointed up the complementary influence of the science and the art. Two, however, were purposely directed toward the science rather than the art, in the effort to remind the audience at the outset that measurement is a means and not an end. All fourteen of the papers are presented in full in the following pages. In addition, from a tape recording of the discussion following the twelve papers on instrumentation, the editors have prepared summaries of the essential comments, and these are appended to each paper.

In spite of the conflicts resulting from the steadily growing number of technical meetings, the attendance of the conference reached a comfortable total of 219 engineers and scientists from 35 different states. Twenty-two of them remained at the Institute an additional two and one-half weeks to participate in a special course on laboratory techniques, the accomplishments of which are being published separately.

To avoid any basis for future protests that the date of the next meeting has not been either well chosen or announced sufficiently far ahead of time, let it be noted at this point that each must coincide with the momentary lull between the spring semester and the summer session of the University, and that the Seventh Hydraulics Conference is hence presently scheduled for June 16-18, 1958.