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time of the meeting. It is apparent that the progress in this field is slow when one realizes that such a problem as the Knudsen accommodation coefficient is still a matter of research and discussion. This fact points to the lack of fundamental information available at this time. Perhaps the needs of the applied scientists will give further impetus to the more basic research effort in the various disciplines upon which gas dynamics must feed.

Hypersonic Flow Research. Frederick R. Riddell, ed. Vol. 7 of Progress in Astronautics and Rocketry, edited by Martin Summerfield. 758 pp. Academic Press Inc., New York, 1962. \$10.50. Reviewed by R. E. Street, University of Washington.

THIS volume is a compilation of papers presented at a conference on hypersonics held at the Massachusetts Institute of Technology in August 1961 and sponsored jointly by the Air Force Office of Scientific Research and the American Rocket Society. Instead of trying to cover all of the multitudinous aspects of hypersonic flows, the papers are concerned only with low Reynolds-number effects, chemical-kinetic effects, inviscid flows, and a fairly complete coverage of current experimental techniques. The type of paper presented is of primary interest to the engineer who is attempting to understand the flow phenomena involved when vehicles re-enter the atmosphere of the earth from orbits or extraterrestrial trajectories.

An introduction by Wood and Pallone summarizes all of the papers in the volume and this brief review can hardly summarize the summary. The papers on viscous effects at low Reynolds number include three on blunt-body flows by Oguchi, by Van Dyke, and by Levinsky and Yoshihara, with a fourth on the Rayleigh problem for a dissociated gas by Moore and Rae. A good general introduction to chemical kinetics is presented by Bauer, followed by two more papers on chemical effects by Wray and by Vaglio-Laurin and Bloom. There are two papers on radiation effects by Treanor and by Teare, Georgiev, and Allen. The inviscid theory of flows about slender wings and blunt bodies is surveyed and extended in a series of papers by Cole and Brainerd, by Freeman, Melnik, and Scheuing, and by Yakura. Finally, a group of nine papers deals with all aspects of experimental methods, including shock tubes, shock tunnels, hot-shot tunnels, arc tunnels, and free-flight. These cover the better-known facilities in the United States and in England for testing at high Mach number, high enthalpy, and low-density conditions by well-known workers in the field.

The papers were well selected and consequently give a true picture of the state of the art, of current attempts to extend our knowledge, and of new results as well. The balance between theory and experiment is good. There are several fairly obvious misprints, and pages 144 and 145 have been interchanged. Also, the changes in notation from paper to paper are disconcerting, and the mathematics is not always clear. How-

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ever, these are trivial matters compared to the quality and value of the material for all workers in hypersonic flow.

Quantity and Quality. The Hayden Colloquium on Scientific Method and Concept. Daniel Lerner, ed. 221 pp. The Free Press of Glencoe, Inc. (Crowell-Collier Publishing Co.), New York, 1961. \$4.50. Reviewed by R. B. Lindsay, Brown University.

AN interesting viewpoint regarding different ways of looking upon human experience is that which distinguishes the qualitative from the quantitative aspects. Some have felt (and apparently they have followers even today) that the most effective way to grapple with experience is to understand its "nature" or "essence", i.e., *what* it is, whereas others have consistently taken the attitude that a grasp of quality is not enough: We must not be contented with our understanding of any element of experience until we can answer the question "how much?" In general we may say that the so-called humane studies tend to stress the importance of the qualitative point of view, whereas the sciences emphasize the quantitative.

The second series of Hayden Colloquium lectures at the Massachusetts Institute of Technology was devoted to an examination of the problem of quality and quantity in various intellectual disciplines. These lectures and three other related ones have been gathered together in the volume under review, with a summarizing introduction by the editor. Seven scholars and scientists present their views on the comparative roles of quality and quantity in mathematics, quantum physics, psychology, neurophysiology, politics and law, and finally economics. The coverage is generous and the points of view so diverse that it is difficult to find much coherence in the book as a whole, one of the common difficulties associated with collections of this sort. For example, it is clear that to the social scientist quantification means essentially the representation of experience in terms of numbers. This was indeed the standpoint of classical physics insofar as the numbers represented the results of the measurement of so-called "quantities". In quantum physics, on the other hand, as the article by Weisskopf in this collection emphasizes with great clarity, the meaning of quantification is essentially a morphological one, i.e., associated with the existence of characteristic forms or patterns in the description of phenomena, particularly on the atomic level. The stationary states of atoms are a good illustration. Similarly as Kemeny points out in his article "Mathematics without Numbers", modern mathematics is becoming in certain lines less and less numerical, and it may well be that these brands of mathematics will have great value as a language with which to describe experience.

Most of the articles are accompanied by brief bibliographies providing guides for further reading. The book strongly suggests the importance of a systematic large-scale treatment of the subject under discussion.