LOUIS MONCHICK

GUEST EDITOR'S INTRODUCTION

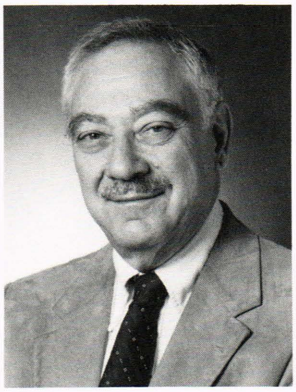
"A man never rises so high as when he knows not whither he is going."
—Attributed to Oliver Cromwell
by Ralph Waldo Emerson
in *Circles*

Science, like revolutions, hardly ever moves in a straight line and never ends up where it is supposed to. Unlike a detective story, it does not know, and may never know, the final answer. Accordingly, apart from a predilection for simplicity and elegance, styles in "doing science" have never stayed quite the same. They have changed from Aristotelian physics to Baconian empiricism, then to Newtonian mechanics, and finally to relativistic and quantum mechanics. The latter alterations replaced the simpler universe of Newton with one more complex but also in some ways just a generalization of our everyday common-sense picture of the world. The apparent complexity of our universe arises because of our analysis of matter into submicroscopic particles and quantum states that we cannot observe and verify directly. To describe our universe in all its myriad forms of motion and appearance is beyond the reach of log tables, slide rules, and simple hand-held calculators. In another change of style, we now find that, except for the masters, the computer is the tool of present-day scientists. Accordingly, whereas the popular idealized picture of a scientist once had him placed thoughtful before a blackboard, chalk poised in his hand, the newest paradigm has him gazing hopefully and sometimes goggle-eyed at a computer screen.

This latest revolution in the accepted style of conducting scientific research has come about because computers have made it possible to attack problems completely opaque to any other kind of analysis. The older style of group theoretical and global analyses, exact solutions of model or specific problems, and the search for universal invariants had enabled us to delineate forests undistracted by the presence of trees, carrying us far from the Newtonian world. With our lack of computational power, we had been forced to take such an approach. The arrival of modern computers has changed all that. They have made it much easier, for instance, to uncover unsuspected complexities embedded in even the simplest systems.

The theme articles in this issue largely comprise a set of computationally intensive investigations undertaken to get answers and to explore areas not amenable to analysis without the use of computers. Given that the common characteristic of the approaches is the extensive use, more or less, of computer or computer-generated models, the objects and methods chosen are quite diverse, reflecting the individual interests and types of expertise—the style, if you will, of the individual investigators. They also reflect the predisposition of science to follow wherever the subject takes it, thereby presumably confirming Cromwell's observation set at the head of these prefatory remarks.

THE AUTHOR



LOUIS MONCHICK was born in Brooklyn, New York, grew up in a suburb of Boston, and received his A.B., M.S., and Ph.D. degrees from Boston University, the latter in 1954. After brief stays at the University of Notre Dame and General Electric, he came to APL in July 1957. Except for several visits to the JHU Homewood campus as part-time assistant professor and Parsons Professor, and to the Universities of Bielefeld and Leiden as a visiting scientist, he has remained at APL. Dr. Monchick has worked in the fields of diffusion-controlled reactions, molecular collision dynamics, and transport properties of polyatomic gases. Two publications in the latter field made the "twenty-two most cited" list of articles published by APL staff members [Berl, W. G., *Johns Hopkins APL Tech. Dig.* **7**(3), 221 (1986)].