



*Francis Arstanits*

## **Memorial Tributes**

NATIONAL ACADEMY OF ENGINEERING

# GIOVANNI ASTARITA

*1933-1997*

BY ARUP K. CHAKRABORTY, GIUSEPPE MARRUCCI, T. W. FRASER FUSSELL, AND ARTHUR B. METZNER

**GIOVANNI ASTARITA**, professor of chemical engineering and materials science at the University of Naples, Italy, and professor of chemical engineering at University of Delaware for many years, died in Naples on April 28, 1997, following a stroke on April 24, 1997. He was sixty-three years old.

Professor Astarita earned his master's degree in chemical engineering from the University of Delaware and doctorate at the University of Naples in 1957. He was a visiting professor at Delaware during the 1965 to 1966 academic year and annually in the fall semesters continuously from 1973 through 1995: the fall semester of 1996 was spent at the Johns Hopkins University. He received the Alpha Chi Sigma award for research accomplishments from the American Institute of Chemical Engineers in 1992 and was elected a foreign associate of the National Academy of Engineering in 1994. At the time of his death, he was one of only eleven chemical engineers worldwide to hold this honor. In Italy he received, in 1995, the Gold Medal for Excellence in Research from the Federation of Chemical Industries.

Professor Astarita's eight books and more than 200 papers revealed him to be a renaissance scholar as his work spanned the full range of rheological, continuum mechanics and chemical engineering interests. His first book was published in 1967 on the subject of mass transfer with chemical reaction; while it served to organize the literature on this subject impressively, it

was even more a philosophical tract on how rigorous analysis of all problems in science and technology should be approached. His insightful analyses of problems have allowed others to see the critical issues in new and frequently much clearer ways. He was a man of broad culture and wide reading who welcomed interruptions—any of us could enter his office at virtually any time to seek his guidance and advice. He would instantly stop his own work and turn to the new issue; the greater the erudition of the issue raised, the greater his enthusiasm for it. Consequently, he was an inspiring mentor for both his students and his colleagues. In the latter stages of his career, he focused on the mentoring of young academic professionals worldwide, the results of which will be with us for many years to come. Perhaps most important, his professional attributes exemplified respect for scholarship, scientific integrity, and the highest intellectual standards.

In the applied physics areas of rheology and polymer processing, he contributed extensively to the early studies of the mechanisms whereby minute concentrations of macromolecules in flowing liquids reduce turbulence and the resulting drag. He discovered previously unexpected discontinuities in the rates at which gas bubbles move through viscoelastic liquids and applied this understanding in later studies of devolatilization processes in production of plastics and rubbers. Professor Astarita was one of the first scholars to note the surprisingly high resistance of viscoelastic fluids to extensional deformations, a subject that became one of the core components of much work in rheology in the ensuing three decades. The utility of plastics in many automotive and aircraft applications is critically dependent on their resistance to solvents; Astarita's work in this area served to organize the badly fragmented literature and identified the worthwhile areas for further study.

Professor Astarita conducted short courses and gave seminars at approximately 100 locations in more than twenty countries worldwide. He gave of himself unqualifiedly to a wide variety of professional organizations. He organized and later became president of the Italian Society of Rheology, and he was a member of the research committee of the British Institution of Chemical

Engineers. He was also a member of the National Academy of Sciences, Letters and Arts (Italy), the European Federation of Chemical Engineers, the Asociacion Argentina de Reologia, the American Institute of Chemical Engineers, the Society for Natural Philosophy (U.S.), and the Society of Rheology. At the time of his death, he was chairman of a group organizing European polymer engineering into a coherent unit that will replace the many separate and somewhat fragmented national groups. He was president of the International Congress on Rheology from 1980 to 1984 and chaired the assembly held in Naples in 1980.

While Professor Astarita's primary loves were clearly for his family and his profession, he enjoyed being near the water and was an avid boater, swimmer, diver, and spear-fisherman. He spent much of his spare time in a small fishing village, San Marco, on the coast south of Naples. He was also an intense bridge player who attained the rank of Master in the Italian Bridge Federation. All of Gianni Astarita's social interactions were laced with humor and self-deprecating wit. In emphasizing to young scholars the importance of preliminary order-of-magnitude estimates of an answer sought—and how one needn't guess the ultimate answer with too much accuracy for it to be useful—he anecdotally refers to an event in his early professional life. A friend of his father had an option for purchase of a tract of timber and was in a quandary as to its true value. Gianni inquired as to the diameter and height of typical trees, and their spacing, then quickly estimated the probable value of the lumber to be derived from this. Some months later, on meeting his father's friend again, this individual thanked Gianni exuberantly for the earlier estimate: he had based his purchase price on this, but the total lumber harvested proved to be severalfold greater than predicted and he hoped all of Gianni's subsequent order-of-magnitude estimates would be as valuable!

We mourn the loss of a long-standing and esteemed renaissance scholar, colleague, and friend. We are left enriched by his presence among us. In the words of his friend and frequent collaborator, Rutherford Aris, “Gianni knew the difference between excellence and success. He achieved both and was spoiled by neither.”