



Y. Mori

YASUO MORI

1923–2012

Elected in 1986

*“For contributions to heat transfer and energy conversion research,
and for contributions to international scholarly exchanges.”*

BY ARTHUR E. BERGLES

YASUO MORI, professor emeritus of mechanical engineering at Tokyo Institute of Technology, died on March 20, 2012, at the age of 89. He was a superb engineering educator and an outstanding leader in the international heat transfer community.

Yasuo was born in Tokyo on February 24, 1923, raised by his parents in the company of two brothers and a sister, and stayed in Tokyo most of his life. In 1942 he graduated from Dai-Ichi High School, a gateway to Tokyo Imperial University (University of Tokyo), which he attended in the deteriorating environment of the war years. He studied aeronautical engineering and earned a bachelor’s degree in October 1945, shortly after the conclusion of the Pacific War. He belonged to the generation that experienced social disruption and economic hardship brought about by the war, as well as the introduction of American culture after the war. His experiences in those difficult years contributed to his commitment to hard work, dignity, justice, and international collaboration.

He was on the way to becoming a junior faculty member in aeronautical engineering at the University of Tokyo when the department was shut down in 1946 at the behest of the US government, which was busy eliminating the remnants of military technologies in postwar Japan. Having seen his career

path at the university closed, he landed a research job in a government laboratory, the Institute of Physical and Chemical Research (RIKEN), in 1947. In 1953 he moved to the Tokyo Institute of Technology (TIT) as a research associate, and in a few months was appointed to associate professor. His research at RIKEN and TIT was fruitful and, after submitting a doctoral thesis to the University of Tokyo, he was granted a doctor of engineering degree in 1956. (At the time, graduate schools were not established; a doctoral degree was granted on the basis of a submitted thesis and the applicant's performance at its defense.) In 1961 he was promoted to professor, and remained with TIT until his mandatory retirement in 1983.

From 1983 to 1988 he continued teaching and research at the University of Electro-Communications in suburban Tokyo. After his final retirement from teaching, he consulted for an instrument manufacturing company, Tokyo Keiso, for several years. In 1990 he was recruited by the Ministry of Foreign Affairs to become an advisor and senior scientist for a US-Japan joint research project at the Pacific International Center for High Technology in Honolulu. He served there for two years, then retired to a quiet life in his hometown in a western suburb of Tokyo.

As a young man Yasuo Mori earned recognition from the heat transfer research circle in the United States for his paper "Buoyancy Effects in Forced Laminar Convection Flow Over a Horizontal Flat Plate," published in 1961 in the *ASME Journal of Heat Transfer*. The paper was the result of his work at Cornell University, where he was a Fulbright visiting scholar in 1959–1960. In this work, he used a perturbation expansion technique to solve a nonlinear problem where vertically applied buoyancy was superposed on a horizontally developing boundary layer flow. Later at TIT, he conceived a more powerful method to solve complex three-dimensional convection heat transfer problems. This technique was applied to the analysis of flow and heat transfer in tubes under the influence of various body forces. The results were distilled to a set of concise formulas for use by the designers of spiral tube heat exchangers, coolant paths of electric generators, and other equipment.

During his academic career, Yasuo expanded his research to a wide range of subjects related to the development of energy sources and the efficient use of energy. One of the projects to which he was committed for many years concerned the development of magnetohydrodynamic (MHD) power generation. Important research topics for this project were heat transfer from plasma to the electrode, shockwave formation, and combustion in MHD channels. He also extended his research to other high-temperature heat transfer topics associated with another national project on multipurpose gas-cooled reactors as well as nitrous oxide and carbon dioxide issues. In addition, he played a leading role in projects on the use of geothermal and ocean thermal energy. While such large-scale projects were largely run by practicing engineers, he consistently emphasized the role of academics in providing industrial designers with a solid and accurate scientific knowledge base.

He demanded convergence of theory and experiment in arriving at a conclusion. His philosophy of research benefited the graduates of his laboratory, who numbered more than 300 (including undergraduates who performed BS thesis work) and most of whom went to work in industry, remembering his teaching during their careers. Many were proud coauthors of papers published in journals and conference proceedings. Yasuo himself was an author or coauthor on more than 300 papers and 15 books (one authored, 11 coauthored, and 3 coedited).

Yasuo's legacy is in the Japanese heat transfer community. He was a founding member of the Heat Transfer Society of Japan and served as its president in 1978; he took the initiative to develop the Society's organization, enhance its financial foundation, and create a scholarly award for young researchers. He also contributed to the development of the Japanese mechanical engineering community through his official services to the Japan Society of Mechanical Engineers (JSME); he served on the JSME board of directors four times in the 1960s and 1970s, and was vice president in 1978.

His legacy includes efforts to establish channels of international collaboration in heat transfer research for his peers and younger generations of researchers. He chaired the JSME Board of International Affairs during his tenure on the Society's board of directors, and initiated an International Cooperation Program, through which JSME supports bi- and multinational conferences. He played a pivotal role in organizing the International Heat Transfer Conference in Tokyo in 1974 and the first US-Japan Heat Transfer Seminar in Tokyo in 1980. He was the principal coorganizer of the first US-Japan Thermal Engineering Joint Conference (Honolulu, 1983) and the US-Japan Heat Transfer Seminar in San Diego (1985). He was actively engaged with the International Center for Heat and Mass Transfer (ICHMT) since its foundation in the early 1970s, and was its president from 1990 to 1994.

He served as an editor or advisory board member for major international journals: the *International Journal of Heat and Mass Transfer* (1973–1986), *International Communications in Heat and Mass Transfer* (1976–1986), *Energy Developments in Japan* (1980–1987), and *Heat Transfer Japanese Research* (1975–1986). He was invited to present keynote lectures at major international conferences and universities, and was Springer Distinguished Professor at the University of California, Berkeley, in 1984.

The list of awards bestowed on Yasuo Mori by Japanese societies and government includes the JSME best paper award four times (1963, 1973, 1980, 1984), the Award for Distinguished Services to the Promotion of Science and Technology (Tokyo Municipal Office, 1982), the Award for Significant Contributions to the Development of Large-Scale Technology (the Ministry of International Trade and Industry, 1986), JSME Thermal Engineering Division Award (1989), and the Order of the Rising Sun, Gold Rays with Neck Ribbon (1999). He also received the ASME Heat Transfer Memorial Award (1982), the AIChE/ASME Max Jakob Memorial Award (1988), and the ICHMT A.V. Luikov Medal in 1988. He was especially proud of his election in 1986 to the US National Academy of Engineering as a foreign associate.

In the international heat transfer community, Yasuo is remembered both for his quick thinking and sharp manner of discussion at conference sessions, and as a congenial and likable gentleman on private occasions. He was also known as an avid sportsman since his youth. He played baseball and skied with his students, and in later years excelled in golf. Many of his former students challenged him on the golf course, but bit their lips as they realized that he was above them even in casual play.

Yasuo is survived by his wife Reiko to whom he was married for 59 years. The couple had no children, but one of their nieces was very close to them—almost like an adopted daughter. Reiko describes him as a warmhearted and gentle husband, and cannot imagine that he demanded rigor and discipline from his students in their research work. Those students who experienced his stern guidance, however, sensed that he had a genuine warm heart and that he never lost confidence in them.

Hearing of his death, the alumni of his TIT laboratory staged a memorial. Many stories about Yasuo were told at the event. One, in particular, stands out: The Mori laboratory was in a barracks from which the main faculty building was visible. It was a daily experience for the students to see Prof. Mori emerge from the faculty building and dash to the laboratory with his white laboratory coat flapping. This was the indication that he had suddenly gotten an idea on research and wanted to promptly convey it to a student. The students were alerted and enjoyed the game of guessing who would be approached during the impending visit.

Yasuo's achievements stand out not only in his research but also in his inspiration of so many generations of students who remember him with great respect, pride, and warmth. Foremost among the presenters was his doctoral student Wataru Nakayama, who kindly provided material for this tribute.