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In memoriam— Professor Kunio Hijikata (1943–1997)

Professor Kunio Hijikata, 54, an accomplished scholar and educator, died of ischemic heart failure on 18 May 1997. At the time of his death he was Chairman of the Thermal Engineering Division of the Japan Society of Mechanical Engineers, a Leading Organizer of the 1999 JSME/ASME Thermal Engineering Joint Conference, Chief Editor of *Thermal Science and Engineering of the Heat Transfer Society of Japan*, Chief Editor of the *JSME International Journal*, and serving on the board of several advisory committees for the Japanese government, as well as the Japanese and international professional societies.

Professor Hijikata received his Bachelors (1966), Masters (1968), and Doctorate (1971) degrees from the Tokyo Institute of Technology. He has been associated with the Tokyo Institute of Technology throughout his professional career, as a Research Associate (1971–1978), an Associate Professor (1978–1987), and a Professor (1987–1997). During the early years of his tenure at the Tokyo Institute of Technology he worked closely with Dr Yasuo Mori, now Professor-Emeritus of TIT, who was his thesis advisor and life-long mentor. In 1982 he had the opportunity to stay at the University of California, Berkeley, and worked with Professor Chang-Lin Tien, who also has been his close associate since then, and assisted Professor Hijikata in expanding his personal sphere in the international heat transfer community. Besides teaching at the Tokyo Institute of Technology, he was invited to lecture at many universities including the University of Tokyo, Hokkaido University, Kyushu University, and he was a Springer Professor at the University of California, Berkeley, in 1993.

Professor Hijikata also left a long record of professional societal service. He served in an editorial capacity of *Nuclear Engineering and Design*, *Experimental Heat Transfer*, *Journal of Flow Visualization and Image Processing*, *Heat Transfer Japanese Research* and *Microscale Thermophysical Engineering*. He organized two Japan–U.S. Science Seminars on “Molecular and Microscale Transport Phenomena” (1993, 1996), as well as an International Center for Heat and Mass Transfer Seminar on “Imaging in Transport Processes” (1994). He helped to organize the Japan–U.S. Science Seminar on “Environmental Protection” (1995), the JSME–ASME International Conference on Power Engineering (1993), and the NATO Advanced Study Institute Conference on “Convective Heat and Mass Transfer in Porous Media” (1991). He was on the executive board of JSME and the Japan Society of Multi-Phase Flow, and on the advisory committee for the Japan Academy of Science, and the Agency of Science and Engineering. He was Vice-Chairman of the Heat Transfer Society of Japan (1993–1994) where he played pivotal roles in promoting it to a chartered society under the auspices of the Ministry of Science and Education.

The breadth of Professor Hijikata’s contributions to heat transfer science and engineering is exhibited by the wide spectrum of his research interests: two-phase flows, phase change heat transfer, bubble dynamics, heat transfer enhancement, electric field effects on heat transfer, heat

exchangers, thermal energy storage, plasma processes, electronic cooling, environmental heat transfer, and microscale heat transfer. His efforts in these areas include a variety of experimental, analytical and numerical methodologies. His approach to all his research is distinguished by his relentless pursuit of the basic understanding of fundamental phenomena. He published his research results in more than 200 journal articles, books, monographs and invited articles. His career was distinguished by its breadth and originality.

His keen insight is demonstrated through his scholarship in the area of two-phase flow and condensation. He investigated almost every aspect of these phenomena including non-condensable components, binary systems, Marangoni effects, convective contributions, dropwise condensation, filmwise condensation, geometric issues, component property aspects, to name a few. He received the JSME Best Paper award in 1980 for his work on filmwise condensation. This extensive body of pioneering research provides a foundation for our current understanding and approaches.

The exceptional contributions of Professor Hijikata’s research are matched by his development of innovative experimental techniques. In one example from his visualization research, Professor Hijikata pioneered the application of high-resolution holographic techniques for instantaneous pressure field on surfaces. The impact of his visualization experiments may be recognized by their use in many industrial laboratories and by the JSME through the Best Paper award in 1988.

Most recently, Professor Hijikata focused on microscale thermal phenomena. His measurement methodology of thermoelectric voltage at point contacts provides the unique ability to characterize the microstructure of surfaces as well as to study electron transport in highly confined geometries and at cryogenic temperatures. In addition, Professor Hijikata studied a variety of topics on high T_c superconducting microbolometers, microscale bubble and droplet nucleation, and scanning thermal microscopy. He developed new techniques for thermal probe fabrication and used the same probe for both thermal and electrical characterizations of materials with nanometer-scale spatial resolution. He launched several students and post-doctoral fellows into this new and exciting field, with these efforts providing the foundation for many future microscale thermal researchers.

Besides his achievements in heat transfer research Professor Hijikata has been known as a superb educator and an effective coordinator in the Japanese and international heat transfer communities. He promoted heat transfer science through the nationally televised educational programs aimed at junior-high and high school students in Japan. In recent years he has been a prime figure in the community-wide effort to provide the general public and non-specialists with digested knowledge of heat transfer through the electronic media. His book on *Computer-aided Heat Transfer*, first published in Japan and later by Elsevier, won wide acclaim from students, industry designers and engineers. He also organized to publish a disk version of the *JSME Heat Transfer Hand-*

book, which has been one of the best-selling publications from JSME. His down-to-earth manner of teaching in the university classroom not only gained him enormous popularity among students, but has also proved effective in producing a troupe of highly qualified heat transfer engineers.

Professor Hijikata's contributions in fostering strong collaboration between Japanese and U.S. researchers have also influenced several careers. Many U.S. post-doctoral researchers and graduate students visited and worked in his laboratory, while his own students and doctoral graduates came to work in U.S. research laboratories. Professor Hijikata took deep concern in the professional development of the young researchers who came to work with him, ensuring that they had ample opportunities for professional growth within the Japanese technical community. He also took personal concern in his visitors, arranging funding, housing, and the myriad of other details that face visitors to Japan, and even serving as best man at at least one wedding. His love for the field of heat transfer, his enthusiasm, and his energy provided a model for those that worked with him. As with his research, Professor Hijikata's impact on those researchers who had the opportunity to work with him in

Japan will be felt throughout their careers, and subsequently in the careers of the students that those researchers will serve as mentors. Through his actions and by setting an example, he demonstrated the best possible benefits of Japan and U.S. collaboration.

While his efforts to enhance the collaboration will be missed, his broad grin, warm handshake, and friendly demeanor will live on in our hearts and minds for years to come. On behalf of his friends and colleagues, we send our deepest sympathy to his family. The international community will always remember his significant scholarly achievements, his tireless inquisitiveness, and his warm personality.

TAKAYOSHI INOUE
SUSUMU KOTAKE
YASUO KUROSAKI
WATARU NAKAYAMA
RICHARD BUCKIUS
ARUNAVA MAJUMDAR
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