



Arthur Edward Bergles

ARTHUR E. BERGLES

1935–2014

Elected in 1992

*“For seminal contributions and outstanding service
and leadership in the field of heat transfer.”*

BY R.M. MANGLIK AND R.J. GOLDSTEIN

ARTHUR EDWARD BERGLES passed away March 17, 2014, after an extended battle with a malignant brain tumor. He was 78.

During his exemplary academic and professional career over more than five decades, Art, as he was known to his many friends and colleagues worldwide, made seminal and path-breaking contributions in boiling and two-phase flows, process heat transfer, electronic and microelectronic cooling, and enhancement or augmentation of heat transfer.

Because of his pioneering work, which spanned the spectrum from microscale to the very large-scale, the field of heat transfer enhancement grew rapidly and came to be regarded as a “second-generation heat transfer technology” across the globe. Underscoring the urgency of addressing the energy-water nexus, Art would paraphrase the poet Coleridge’s dilemma (“Water, water, everywhere, / And all the boards did shrink; / Water, water, everywhere, / Nor any drop to drink”) and tirelessly advocate conservation along with research in and application of advanced enhancement techniques in all heat and mass transfer systems.

Art was born in New York City on August 9, 1935, to Edward and Victoria Bergles, who had immigrated from Austria. A self-taught engineer, Edward and his family moved

to Rhinebeck, New York, where he completed building a hydroelectric power plant in 1938, which ran almost continuously for 47 years, producing 25 kW power.

Art attended a one-room schoolhouse and subsequently the Rhinebeck Central School System, where he graduated as valedictorian and earned his Eagle Scout Award. He studied mechanical engineering at the Massachusetts Institute of Technology (MIT), where he received his combined SB and SM degrees in 1958 and his PhD in 1962, with an intervening year as a Fulbright Scholar at the Technical University in Munich. While at MIT, he met his future wife, Priscilla (Penny) Maule, who was working in the Magnet Laboratory; they married in 1960. He earned his PE (mechanical engineering) in the state of Massachusetts in 1965.

Art started his academic career at MIT, first as research staff at the National Magnet Laboratory and in 1963 as the Ford Assistant Professor in Mechanical Engineering, before moving to the Georgia Institute of Technology as professor in 1969. In 1972 he became chair of Mechanical Engineering at Iowa State University (ISU) and was named the Anson-Marston Distinguished Professor of Engineering in 1981. After stepping down as chair in 1983, he continued to direct the Heat Transfer Laboratory at ISU until his move to Rensselaer Polytechnic Institute (RPI) in 1986. At RPI he was appointed Clark and Crossan Professor of Engineering and later served as dean of engineering (1989–1992).

In 1997 ill health forced him to retire, but even in “retirement” Art remained active as the Clark and Crossan Professor of Engineering Emeritus and senior lecturer in mechanical engineering at MIT, with an adjunct appointment as Glenn L. Martin Institute Professor of Engineering at the University of Maryland. He continued to write papers, give seminars, interact with researchers around the world, travel to conferences, and more, and would often remark, “I’m still doing what I was doing before I retired, but now I don’t get paid for it.”

Art’s research in heat transfer was multifaceted and multidisciplinary, covering a variety of engineering systems and all modes of heat transfer processes. Most significantly, in his

pioneering and extensive work on enhanced heat transfer, his many fundamental experimental and theoretical investigations were always conducted in the context of practical applications and the need to move research to industry. He was a very early investigator of, and advocate for, improved microelectronics cooling. He worked in boiling, condensation, and laminar and turbulent single-phase flows, and his passion for fundamental and applied research was further anchored by a strong interest in history; he wrote several papers on the history of heat transfer. Besides his many seminal, groundbreaking, original research articles, his writings included numerous well-received review papers that provided guidance for researchers seeking newer directions.

Relative to this latter effort, and highlighting Art's dedication to ensuring a meaningful future of heat transfer education and research, he and Warren Rohsenow very generously endowed and established the Bergles-Rohsenow Young Investigator in Heat Transfer Award in 2003. This ASME society-level annual award has been given to 10 outstanding young professors to date. Moreover, in 1997 Art and Penny endowed the Bergles Professorship in Thermal Sciences in the ISU Department of Mechanical Engineering to attract or retain an outstanding senior faculty member. This shared commitment to scholarship and research, with gifts from friends, faculty, colleagues, and corporations, also led to the endowment of the Dr. Arthur E. Bergles Scholarship in 1996 on the occasion of his retirement from Rensselaer.

Art's passion for education and fostering the careers of young scientists is further reflected in the fact that he was an advisor for 82 thesis students, and volunteered his time to serve on a number of fellowship and award selection committees. His research with students and colleagues resulted in more than 400 papers, 26 books, and some 400 invited lectures around the world.

Art was acknowledged as one of the world's leading experts in the thermal sciences, as evidenced by the international honors and awards that marked his distinguished career. Besides being elected to the NAE, he was inducted in the Polish

Society of Theoretical and Applied Mechanics (1987), UK Royal Academy of Engineering (2000), Academy of Sciences and Arts of Slovenia (2001), and Italian National Academy of Sciences (2003). He was a fellow of the American Society of Mechanical Engineers (ASME), American Association for the Advancement of Science (AAAS), American Institute of Chemical Engineers (AIChE), American Society for Engineering Education (ASEE), and American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE), and associate fellow of American Institute of Aeronautics and Astronautics (AIAA), and was awarded four honorary professorships (University of Ljubljana, Slovenia, 1997; Technical University of Denmark, 1998; Beijing Polytechnic University, 2001; and St. Petersburg State Polytechnic University, Russia, 2008), and received honorary doctorates from the University of Porto, Portugal (1998), Rand Africaans University, South Africa (1999), and Sapienza University of Rome (2009). He was honored with all the major awards in heat transfer: the ASME Heat Transfer Memorial Award (1979), AIChE Donald Q. Kern Award (1990), ASME-AIChE Max Jakob Memorial Award (1995), ICHMT (International Centre for Heat and Mass Transfer) Luikov Medal (1998), Nusselt-Reynolds Prize (2001), ASHRAE's F. Paul Anderson Medal (2000) and Holladay Distinguished Fellow Award (2002), and the International SFT Award by the French Thermal Society (2002), among many others.

Not only did Art pursue education and research, he gave back to the community by being very active in professional organizations. He was named a life member of ASEE and ASHRAE and a 50-year member of ASME. His achievements and recognitions in professional service included terms as ASME president (1990–1991), honorary member, its highest recognition (1996), and member of the board of governors, as well as selection for the ASME Medal (2000) and the ASEE Benjamin Garver Lamme Medal (1987). He served a six-year term as the National Research Council (NRC) liaison for the Mechanical Engineering Section of the NAE, and was a member of the NRC panel to select Ford Doctoral Fellows, the Visiting Committee in Mechanical Engineering at Maryland,

and the Engineering Advisory Committee at the University of Connecticut. He served on the board of directors of the MIT Club of Cape Cod for four years, cochaired the MIT Class of 1957 50th Reunion, and was elected president of the class. He was also president of the Osterville, Massachusetts, Rotary Club in 2010–2011.

In an insightful reflection of the past and contemporary times, Art had constantly held “the future to be bright for heat transfer,” and especially for enhancement of heat transfer, as the essential role of the associated advanced research and engineering is unquestionable in the renewed global urgency of addressing energy and energy-water nexus issues.

Art Bergles is survived by Penny, sons Eric and Dwight, and five grandchildren. He and Penny had celebrated their 50th wedding anniversary on June 19, 2010, and while he was also an avid golfer, they had shared interests in swimming, snorkeling, skiing, and gardening.