WILLIAM C. REYNOLDS

1933–2004

Elected in 1979

"For development of theoretical bases for convective heat transfer analysis and contributions to fluid mechanics."

BY PARVIZ MOIN

WILLIAM CRAIG REYNOLDS died of a malignant brain tumor at his home in Los Altos, California, on January 3, 2004, after 53 years at Stanford. He was 70 years old.

Born in 1933 in Berkeley, Bill entered Stanford as an undergraduate and chose to remain there for the rest of his career. He completed his bachelor's (1954), master's (1955), and doctoral (1957) degrees at Stanford and then joined the faculty. He chaired the Department of Mechanical Engineering from 1972 to 1982 and from 1989 to 1992.

As a scientist, Bill was the ultimate independent thinker, a self-starter, perhaps even a maverick. While following his muse, he might have repeatedly reinvented the proverbial wheel, but he also found novel and exciting ideas and designs that enriched the field of engineering and inspired the people around him. He was a true believer in the familiar maxim, "If you want something done right, you had better do it yourself." Not a natural delegator and an advocate of hands-on problem solving, he usually found himself immersed in a variety of projects. Fortunately, he was blessed with boundless energy and indefatigable enthusiasm.

Bill's main research interest was in turbulent flow, but he worked in nearly all branches and extensions of fluid mechanics, using experimental, theoretical, and computational methods with equal facility. The list of research areas in which he

participated includes: blow-down thermodynamics, ignition of metals, non-isothermal heat transfer, zero-g fluid mechanics, turbulent boundary-layer flow structure, turbulence-wall interactions, stability of gas films, hydrodynamic stability, boundary-layer calculation methods, surface-tension-driven flows, organized waves in turbulent shear flows, turbulence computation, unsteady turbulent boundary layers, internal combustion-engine-cylinder flows, unsteady jets and separating flows, turbulence modeling, flow control, microelectromechanical systems (MEMS), and large eddy simulation (LES) of turbulent flows.

Bill was one of the first to embrace the computer, and he authored programs for his own work, many of which were subsequently used by others worldwide in teaching and research. His program for chemical equilibrium analysis, STANJAN, for example, is used at more than 100 universities in the United States and around the world. In 1971, he and Joel Ferziger initiated the highly successful turbulence simulation program at Stanford. Bill pioneered the introduction of the LES technique in engineering analysis, which is widely used today .

Bill's honors included fellowships of the American Society of Mechanical Engineers (ASME) (1979) and the American Physical Society (APS) (1982), election to the National Academy of Engineering (1979) and the American Academy of Arts and Sciences (1995), and the Fluid Engineering Award of ASME (1989) and Otto Laporte Award from APS (1992).

Bill was an outstanding teacher. His knowledge was deep, his ability to explain difficult concepts was exceptional, and his passion and enthusiasm in the classroom were legendary. With unusual clarity of thought and "out-of-the-box" design of problems, his textbooks on thermodynamics are standouts in the field. Strongly physics-based and very fundamental in their approach, his textbooks reveal a depth of understanding that makes for both solid teaching and a satisfying read.

Besides being an outstanding research scientist and teacher, Bill Reynolds was a classic do-it-yourselfer in the great tradition of American engineering. He could often be seen in the department workshop on weekends, working on a piece of hardware, academic or domestic. He designed and built his Los Altos home,

had it re-engineered after it was severely damaged in the 1989 Loma Prieta earthquake, and took on many of the rebuilding tasks himself. He wrote his own word processor program, which could elegantly display mathematical equations. If he needed something in his work, he invented it, and he managed to get into everything: computer science, electronics, MEMS, optical instrumentation, and complex mechanical transmissions. He took on all problems, figured them out, and solved them.

Bill was never intimidated by technical challenges. After traditional cannons were banned in Stanford Stadium because of a misfiring accident in 1970, Bill and one of his graduate students built an "impulse horn" to be sounded at the 1971 Rose Bowl game after every Stanford score and at the appropriate moment during "The Star-Spangled Banner." Bill's horn reverberates through the stadium to this day.

Music was an important part of his life. He played the trumpet and arranged music for his own and other dance bands while a student at Stanford and enjoyed jazz concerts throughout his life. After his official retirement in 2000, even while he was still active in academic life, he took up music again, playing trumpet and arranging music for an amateur big band group.

At a memorial service for Bill in the Stanford Memorial Church on January 20, 2004, the church was overflowing. An estimated 700 people attended, an indication of the deep respect and affection for him in the Stanford community and beyond. After the service, in a moving salute, a small group of student band members fired his cannon three times while another student played "Taps" on the trumpet.

His departure surely represents the end of an era at Stanford. The editors of the *International Journal of Heat and Fluid Flow,* who dedicated an issue to his memory, wrote that the world of fluid mechanics had lost "one of its strongest and most inventive and charismatic leaders."

Bill is survived by his wife of 50 years, Janice Reynolds, sons Russell and Peter Reynolds, and daughter Margery Reynolds.