

# MEMORIAL RESOLUTION JOHN ROBERT SPREITER, PH.D

(1921-2000)

John Robert Spreiter, a professor emeritus of applied mechanics at Stanford, died at his home on Maui, Hawaii, on February 6, 2000, after a two-year struggle with cancer. He was 78.

Spreiter is remembered for his fundamental and pioneering work in aeronautics and contributions in transonic aerodynamics made from the mid-1940s through the 1970s. He also was well known throughout the astronautics and space physics community for seminal work from the 1960s to the 1990s on the interaction between solar wind and the magnetospheres of planets. Joan Feynman (JPL) remembers: "At the start of the 1960's we were not sure the solar wind was continuous and "collisionless shock" was an oxymoron." John Spreiter was a young aeronautical engineer at Ames Research Center among the small group famous for showing that an airplane could go from subsonic to supersonic flight without catastrophe. He applied his knowledge and skills to describing the solar wind flowing past the Earth's magnetic field. He had the imagination to treat the solar wind with a very low density of electrons moving at one million miles per hour as a continuous fluid and was successful!

At Stanford, he lectured in the Aeronautics and Astronautics Department from 1951 to 1968 and taught courses (geophysical fluid dynamics, atmospheric and space physics, fluid dynamics and mechanics of materials) in the Mechanical Engineering Department from 1968 to 1993.

"Professor Spreiter was that one in a thousand professors who knew science and mathematics so completely, so thoroughly, that he could approach any problem from any theoretical direction, script the governing equations, morph the problem, show the revised equations and gradually apply simplifying assumptions, gently taking his audience with him through every step while mixing in the history of the derivations and the idiosyncrasies of the scientists," said Carleton Ruthling, Spreiter's last doctoral advisee. "The ultimate test of mastery of a scientific discipline is if you can digest the phenomena and explain it to an untrained mind. The grace with which John was able to do this will always inspire me. What a gift he had!"

Dr. Janet Luhmann of the University of California-Berkeley, who worked with Spreiter on the Pioneer Venus Orbiter, recalled: "John was always the consummate voice of reason, the mediator, the deep and quiet thinker, the 'eye in the storm' in heated debates. He set the tone of collegiality that kept us all on course and reminded us of the real good – knowledge – and the real enemy – ignorance. He will be greatly missed for his insights, for his support of his collaborators and friends, for his wonderful combination of ultimate professionalism and incredible warmth."

Born on Oct. 23, 1921, Spreiter loved to spellbind listeners with stories of his childhood in Staples, Minn. As a boy growing up in a small depression-era town, Spreiter was inspired by the excitement of flight and spent much time designing, building and flying model airplanes. He graduated at the top of his high school class and went on to the

University of Minnesota, where from 1939 to 1943 he studied to become an aeronautical engineer.

Upon graduation, Spreiter was recruited for a job in California at the new Moffett Field Ames Research Center. His early work at Ames was in airplane design and stress analysis - in particular, the aerodynamics of high-speed flight and the recovery of fighter planes from high-speed dives. During World War II, Spreiter served with the Ames Naval Detachment.

Spreiter later enrolled at Stanford University, obtaining a master's degree in engineering science in 1947 and a doctorate in applied mechanics in 1954, with research on transonic flow past airfoils and wings. He began some lecturing at Stanford in 1951.

His pioneering work at Ames continued under the new National Advisory Committee for Aeronautics. In 1962, he was made chief of the theoretical studies branch. When NACA became NASA, Spreiter sought to apply his knowledge of aerodynamics and pressures to space physics. He became a full professor of applied mechanics and aeronautics and astronautics at Stanford in 1968.

His theoretical work on the interaction of solar wind with planetary magnetospheres was later shown to be highly accurate when actual space data became available. He made fundamental contributions to the understanding of the physics of the Earth's magnetopause, bow shock and magnetosheath region, and extended those concepts successfully to virtually all the planets in the solar system. In the '90s, this work found a new application in the field of space weather forecasting. The models that Spreiter and one of his former pupils, Dr. Steve Stahara, now of RMA Aerospace Inc. in Cupertino, derived now provide an essential segment for the accurate warnings of geomagnetic storms, which can have dramatic consequences on Earth, disrupting telecommunications and electric power.

After his retirement from Stanford in 1992, Spreiter and Wesleyan University Professor Stewart Gillmor co-edited *The Discovery of the Magnetosphere*, a book that brings together stories from many of the scientists involved in this work. Stanford briefly called him out of retirement to teach for the 1992-93 school year. He was made a Fellow of the American Geophysical Union in 1994.

A symposium titled "Intercomparative Magnetosheath Studies" was held in Antalya, Turkey in Spreiter's honor in September 2000. Contributions were published as a special issue of *Planetary and Space Science* (2002) entitled "Solar System Magnetosheaths" in his honor. In the introduction C.T. Russell and Z. Kaymaz (UCLA) write: "J. R. Spreiter left a tremendous scientific legacy. He immediately tackled and solved the hardest problem in space physics, the nonlinear supersonic interaction of the solar wind with the very compressible Earth's magnetosphere. His solution of the properties of the plasma, flow and magnetic field in the region call the magnetosheath is still the yardstick by which we judge both observations and new models, 35 years after his pioneering work. John Spreiter also was a role model of how to conduct oneself as a scientist, how to manage a scientific research group and how to be a most helpful colleague. The expression "a gentleman and a scholar" is a long-standing tribute to the most outstanding members of our field and one most appropriate for John Spreiter. He was in every way a most gentle man and a most accomplished scholar. The field of space physics has been much enriched to have him as one of its major practitioners."

Spreiter enjoyed tennis, ocean swimming, skiing, travel and photography. He is survived by his wife, Brenda Owens Spreiter, whom he married in 1953; daughters Terry Spreiter of Orick, Calif.; Janet Spreiter of Santa Barbara, Calif., with grandsons Will and Travers Adler; Christine Spreiter of Argyll, Scotland; and Hilary Spreiter of Lahaina, Maui, Hawaii; and brothers Charles and Jim and sister, Marge Wonders, all of Minnesota.

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