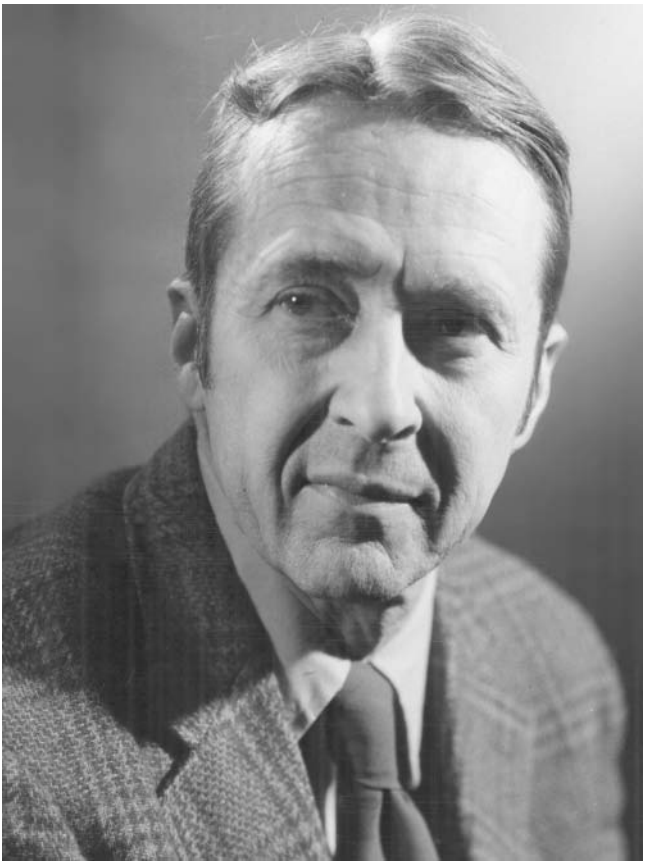

GEORGE F. CARRIER

1918–2002

Elected in 1974

"For leadership in the development and application of mathematical methods for the solution of engineering and geophysical problems."

BY FREDERICK H. ABERNATHY AND ARTHUR E. BRYSON

GEORGE FRANCIS CARRIER, Emeritus Professor of Applied Mathematics at Harvard University, died of esophageal cancer at the Beth Israel Deaconess Hospital in Boston, Massachusetts, on March 8, 2002.

He was born in Millinocket, Maine, on May 4, 1918. His father was a chemical engineer and manager of the Great Northern paper mill in Millinocket. As a teenager, George was a guide in his beloved Maine woods; he worked summer jobs at the mill without his father's knowledge. Following in his father's footsteps, he attended Cornell University, where he received an M.E. in 1939 and a Ph.D. in 1944, working with Professor Norman Goodier. An accomplished clarinet and ocarina player, he organized a swing band at Cornell; he also was houseman at a local pool hall.

When George contracted tuberculosis and had to spend a year in a sanitarium, he studied books on advanced mathematics. He then returned to graduate school where he taught courses in drawing and mechanisms and the first advanced course in applied mathematics for engineers at Cornell. Two students in the latter course, Julian Cole and Ivar Stackgold, said they first heard about asymptotic perturbations and similarity in that course and believed that experience had shaped their careers (they both became distinguished professors of applied mathematics).

George began his technical career in 1944 as a research engineer working for Professor Howard Emmons on the flow of compressible fluids. George helped design and build a high-speed cascade wind tunnel for the study of jet engine turbines and compressor blades. He was a good experimenter, but his extraordinary mathematical-modeling and analysis capabilities set him apart. When Emmons proposed him for a faculty position but was overruled by the rather formal Professor Richard von Mises who thought George was "too much of a wise guy," he went off to Brown University, where he quickly set the academic world on fire.

Stories of George's exploits at Brown abound. He worked with 14 Ph.D. students and is reported to have given a fall course on complex variables that ended by Thanksgiving. In response to complaints, he gave the entire course again by the end of the term. After only five years, he was promoted to full professor.

In 1952, he was invited back to Harvard (von Mises had retired) as the Gordon McKay Professor of Mechanical Engineering. In 1972, he was appointed the T. Jefferson Coolidge Professor of Applied Mathematics. He had 24 Ph.D. students at Harvard, many of whom went on to pursue distinguished careers in applied mathematics. He became an emeritus professor in 1983 but continued to do research.

George was widely considered one of the best applied mathematicians the United States ever produced. He loved applied problems with complex mathematical models, for which he found ingenious approximations and asymptotic results. He had a quick mind and remarkable physical intuition, which made him a much sought after consultant. He could listen to the description of a problem and come up with the solution or an effective approach to the solution in a few minutes. Almost every summer for 40 years, he was a consultant to either the Los Alamos National Laboratory or the Space and Defense Group at TRW in California; both organizations considered him the ideal consultant. Among his many accomplishments at TRW (according to his former Ph.D. student and co-author Frank Fendell) were: (1) showing how a spinning spacecraft could be controlled with a tuned liquid damper (jointly with John Miles of UCSD);

(2) showing how to contend with vortexing during rapid drainage of a propellant tank; and (3) showing how ceiling sprinkler systems might kill people by keeping smoke near the floor. His good friend and distinguished aerodynamicist, Hans Liepmann of Caltech, described him as "the greatest problem solver ever!"

George's favorite subject was wave propagation, and in the 1960s, he taught a graduate course with this description: "Haphazardly selected superficial (but advanced!) investigations in the propagation of waves in various media." The dean objected, but George persisted, arguing that the description was absolutely accurate. Harry Yeh, a distinguished oceanographer, told of how George stimulated his and others' research on tsunamis by pointing out, among other things, that even the Pacific Ocean is too small for a tsunami to evolve into a soliton (solitary wave) through dispersive effects. George provided analytical solutions with simple geometry for the tsunami run-up problem that could be used to check computer simulations with more complicated geometries. George also showed that the eye-formation is a critical feature of the thermal ocean-air interaction in hurricanes.

George was elected to the National Academy of Sciences in 1967 and to the National Academy of Engineering in 1974. He received the President's Medal of Science in 1990 with the following citation: "For his achievement and leadership in the mathematical modeling of significant problems of engineering science and geophysics and their solution by the application of innovative and powerful analytical techniques." He also received many other awards and honors, including the Dryden Medal of the American Institute of Aeronautics and Astronautics, Fluid Dynamics Prize of the American Physical Society, Timoshenko Medal and Silver Centennial Medal of the American Society of Mechanical Engineers, National Academy of Sciences Award in Applied Mathematics and Numerical Analysis, Von Karman Medal of the American Society of Civil Engineers, Von Karman Prize of the Society of Industrial and Applied Mathematics, and Von Neumann Lectureship of the Mathematics Societies.

He served with distinction on 27 committees and panels of the National Research Council of the National Academies, including the Executive Committee of the Assembly of Mathemati-

cal and Physical Sciences, Naval Studies Board, Executive Committee of the Assembly of Engineering, and Advisory Board of the Office of Mathematical Sciences. He was also an associate editor of the *Journal of Fluid Mechanics* and the *Quarterly of Applied Mathematics*.

George authored or co-authored more than 110 technical papers on fluid mechanics, solid mechanics, heat transfer, radiation, stochastic systems, oceanography, and mathematical techniques. In these papers and in his consulting work, he made outstanding contributions to the understanding of tsunamis, hurricanes, wave diffraction, and singular-perturbation theory. He also co-authored three books with Carl E. Pearson, *Functions of a Complex Variable: Theory and Technique, Ordinary Differential Equations*, and *Partial Differential Equations*.

George had boundless energy, a cheerful nature, and was master of his emotions. He knew how to put a fractious committee at ease with a lighthearted remark. He had no appetite for prestige, position, or wealth. He was unfailingly honest, always did what he thought was right, and was quick to admit when he was wrong or made a mistake. He chose to work on technical problems for their usefulness and for the fun he could have. Despite his extraordinary accomplishments, he managed to remain modest and "human."

George was also known for his high jinks. On one occasion, he arranged to have the dean of engineering arrested for a parking violation during the annual Christmas party. On another occasion, during a seminar on guided missiles, he and a prestigious MIT professor "arrested" the speaker and carried him out of the room for revealing "classified information." He was admired as much for his good nature as for his work, and although by his own admission his jokes often deserved only a groan, his humor was affectionate, without malice and contagious.

He loved gardening and building things at his home in Wayland, playing catch with his sons, and dancing with his wife in the living room to a Benny Goodman record. His work habits included watching Perry Mason on TV. A few minutes into the show he would take out a yellow pad of paper and begin writing equations at a furious pace. That way he was able to enjoy Perry

Mason for 40 years, according to his son Mark, because he could never remember "who done it."

His wife Mary (nee Casey) died on July 5, 2006. She and George were a devoted couple for nearly 60 years of married life. They are survived by three sons, Kenneth of Ithaca, New York; Robert of Wayland, Massachusetts; and Mark of Eugene, Oregon; and two grandchildren, McKenzie and Katrina of Eugene, Oregon.