



Gene H. Golub

GENE H. GOLUB

1932–2007

Elected in 1990

“For contributions in developing and analyzing robust and stable numerical algorithms used in solving complex engineering problems.”

BY CLEVE MOLER

GENE H. GOLUB, Fletcher Jones Professor of Computer Science (and, by courtesy, of Electrical Engineering), Stanford University, died on November 16, 2007, at Stanford Hospital. He was 75 years old.

Golub was born in Chicago on Leap Year’s Day, February 29, 1932, to parents who had emigrated from Latvia and Ukraine. He attended public schools in Chicago and then, from 1953 through 1959, the University of Illinois, where he received a B.S. in 1953, M.A. in 1954, and Ph.D. in 1959, all in mathematics.

After a postdoctoral year at Cambridge and brief stints at Lawrence Radiation Laboratory and Space Technology Laboratories, he joined the faculty at Stanford University in 1962. In 1965, he was a founding member of Stanford’s Department of Computer Science, one of the first computer science departments in the world. He became a full professor in 1970 and was chairman of the department from 1981 through 1984.

Dr. Golub was elected to the National Academy of Engineering in 1990 and to the National Academy of Sciences in 1993, and he received honorary doctorates from about a dozen universities worldwide. When he became ill, he had to cancel

a planned trip to receive an honorary doctorate from the Eidgenössische Technische Hochschule in Zurich.

Gene's research and teaching interests were in the field of numerical analysis, a subject that hardly existed when he entered the University of Illinois. But as the power and availability of computers increased, so did interest in numerical analysis. Today, the subject is at the interface between mathematics and computer science. In fact, numerical analysts started many of the world's computer science departments, including the one at Stanford. Years later one of Gene's colleagues at Stanford remarked, "numerical analysis was the mother of computer science, but today she is acting like an anxious grandmother."

Many universities now have interdisciplinary programs in "computational science." In 1988, Gene was the founding director of one of the first such programs in the world. At Stanford, the program was called "scientific computing and computation mathematics."

Gene's specialty was computation involving matrices. His Ph.D. thesis and some of his first research papers were about iterative methods for solving the types of simultaneous linear equations that arise in finite-difference methods for partial differential equations. In the 1950s some experts familiar with the relaxation methods that were then being done by hand were skeptical that those methods could ever be automated. But work by Golub, as well as by David Young and Richard Varga, provided the first analysis of effective iterative algorithms for these large linear systems.

In the 1960s, together with colleagues W. Kahan and Christian Reinsch, Golub developed the first practical algorithm for computing the matrix singular-value decomposition (SVD), sometimes called the "Swiss Army knife" of matrix computation because it is used in such a wide variety of applications. A search of the U.S. Patent and Trademark Office Web page lists more than a thousand U.S. patents that mention "singular value decomposition," all of which were made possible by Golub's algorithm. His California license plate proclaimed that he was "Prof. SVD." Golub also contributed to our understanding

of a large class of iterative algorithms for matrix computations, including the conjugate-gradient method, the Lanczos algorithm, and Krylov subspace algorithms.

Golub was president of the Society of Industrial and Applied Mathematics (SIAM) from 1985 to 1987 and the founding editor of two SIAM journals. He also served on the editorial boards of more than a dozen other journals. In addition, Golub founded the NA Digest, a weekly electronic newsletter that now has more than 10,000 subscribers around the world. At Stanford, he was thesis advisor for more than 30 Ph.D. students, and through them, he now has more than 140 academic descendants.

Everything I have said thus far, however, pales in comparison to Golub's most important characteristic—his humanity. The numerical-analysis and scientific-computing community was his family. The closeness and congeniality of this community is due, in large part, to his influence. Thousands of people in dozens of countries knew him simply as "Gene," and visitors to Stanford, particularly young people, often stayed in his home.

He remembered everybody's name and their children's birthdays, and he returned visits, traveling frequently to give lectures, attend workshops, or just to see people. His friendships, visits, and e-mails not only led to important algorithms and research papers, but also made the world a more pleasant place.