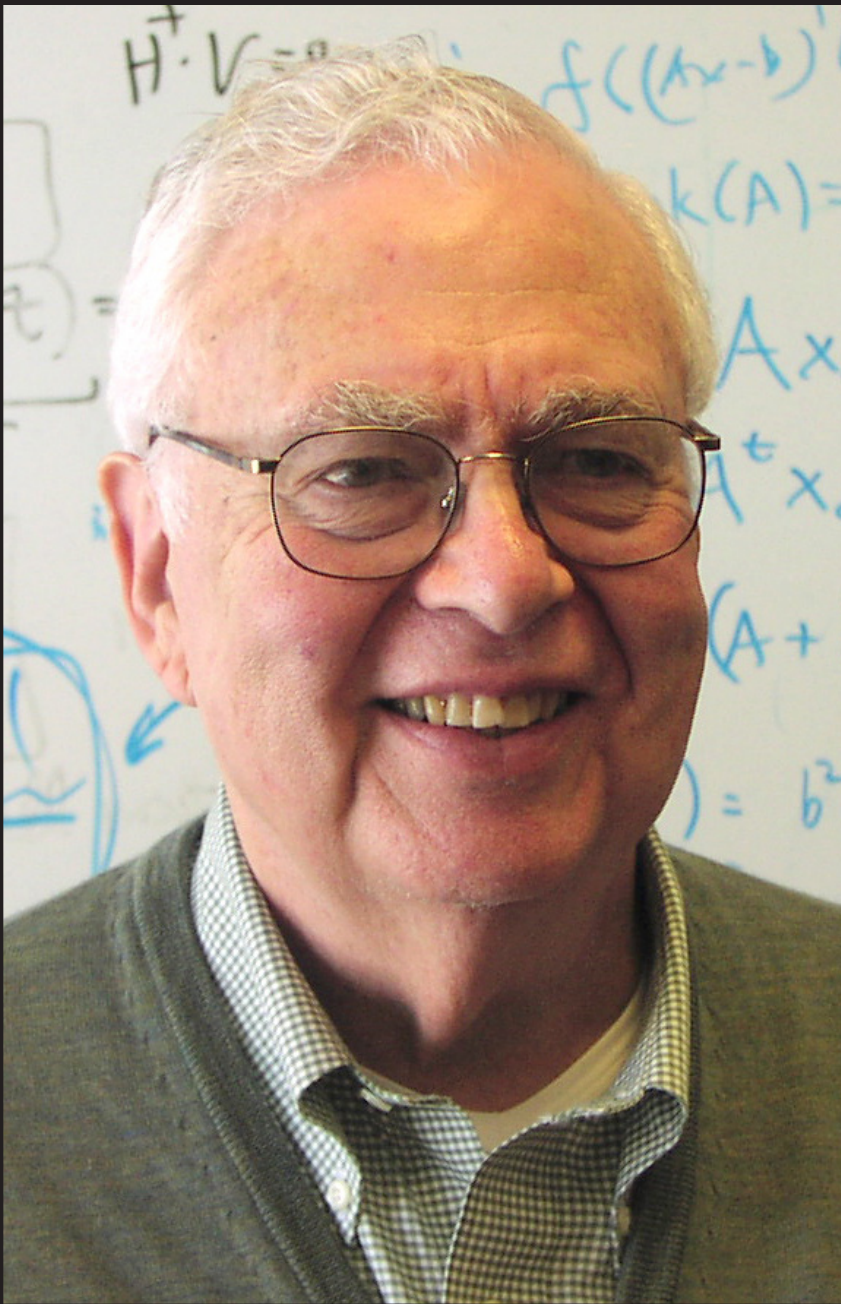


SXSVD: South by SVD

Gene H. Golub's World Day Celebration



Friday, February 29

2:00-8:00pm

A.C.E.S. Building

**Student Poster Session
with Catered Lunch**

2:00-2:45pm A.C.E.S. Atrium

**Science & Memories
with a Birthday Cake**

3:00-7:15pm A.C.E.S. 2.402

**Speakers include: Bjorn Engquist,
Omar Ghattas, Thomas J. Hughes and Orly Alter**

GENE H. GOLUB · CHARLES F. VAN LOAN

MATRIX
COMPUTATIONS

THIRD EDITION

CALCULATING THE SINGULAR VALUES AND PSEUDO-INVERSE OF A MATRIX*

G. GOLUB† AND W. KAHAN‡

Abstract. A numerically stable and fairly fast scheme is described to compute the unitary matrices U and V which transform a given matrix A into a diagonal form $\Sigma = U^*AV$, thus exhibiting A 's singular values on Σ 's diagonal. The scheme first transforms A to a bidiagonal matrix J , then diagonalizes J . The scheme described here is complicated but does not suffer from the computational difficulties which occasionally afflict some previously known methods. Some applications are mentioned, in particular the use of the pseudo-inverse $A^+ = V\Sigma^+U^*$ to solve least squares problems in a way which dampens spurious oscillation and cancellation.