Matrix Computations and Scientific Computing Seminar

Organizer: J. Demmel and M. Gu

Wednesday, 12:10–1:00 pm, 380 Soda Hall

Aug 31 **Eric Hallman**, UC Berkeley

Minimizing the Backward Error in Iterative Methods for Least-Squares Problems

When running any iterative algorithm it is useful to know when to stop. Effective stopping criteria should be both cheap enough not to dominate the cost of the algorithm and reliable enough that the algorithm does not terminate early or too much later than necessary. Here we review LSQR and LSMR, two iterative methods for solving $\min_x \|Ax - b\|_2$ based on the Golub-Kahan bidiagonalization process, as well as stopping criteria for these methods based on estimates of the backward error. We extend LSQR and LSMR to a family of iterative algorithms and in particular introduce LSMB, an algorithm aimed at minimizing one of the backward error estimates. Tests on problems from the Florida Sparse Matrix Collection show that in practice LSMB performs as well as or better than both LSQR and LSMR.