

Matrix Computations and Scientific Computing Seminar

Organizer: Jim Demmel and Ming Gu

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

Oct 28 **William Kahan**, UC Berkeley

Tests for the Accuracy of Polynomial Zero-Finders

It is imprudent to trust a numerical zero-finder without first testing it. Some software used to compute zeros of polynomials has been found surprisingly inaccurate for polynomials even of low degree. Test data provided here takes the form of families of polynomials of degrees 2 - 6 with integer coefficients computable exactly in floating-point, and with zeros whose accuracies challenge numerical methods increasingly as a parameter n is increased. Provided too are formulas to compute the polynomials' zeros extra-accurately without extra-precise arithmetic, so they can be compared with a zero-finder's results to test their accuracy. If these polynomials differ too much from the ones you care about, how do you test your zero-finder on your data? Two easily computed error-bounds, one of them classical, are offered here and compared to help you decide which is better suited to your needs.