FUDAN UNIVERSITY

Applied Math Ph.D. Seminar

Mixed Precision Iterative Refinement for Least Squares With Linear Equality Constraints and Generalized Least Squares Problems

Speaker: Bowen Gao (Fudan University)

Time: 2024-10-31, 16:10 to 17:00

Location: Rm 1801, Guanghua East Tower

Advisor: Meiyue Shao (Fudan University)

Abstract: Recent development on mixed precision techniques has largely enhanced the performance of various linear algebra solvers, one of which being the least squares problem $\min_x \|b - Ax\|$. By transforming the least squares problem into an augmented linear system, mixed precision techniques are able to refine the lower precision solution to the working precision. In this talk, we propose mixed precision iterative refinement algorithms for two variants of the least squares problem—the least squares with linear equality constraints (LSE) and the generalized least squares problem (GLS). Both classical and GMRES-based iterative refinement can be applied to augmented systems of these two problems to improve the accuracy of the solution. For reasonably well-conditioned problems our algorithms reduce the execution time by 40% in average compared to the fixed precision ones from LAPACK on the x86-64 architecture.