

Matrix Computations & Scientific Computing Seminar

Organizer(s): James Demmel & Ming Gu

Wednesday, 12:00Noon–1:00pm, 380 Soda

August 31 **Amal Khabou**, Laboratoire de Recherche en Informatique, Université Paris Sud 11 - INRIA Saclay, France

CALU_PRR: a communication avoiding LU factorization algorithm with Panel Rank Revealing Pivoting

This presentation discusses the LU decomposition with Panel Rank Revealing (LU_PRR), an LU factorization algorithm based on a new pivoting strategy that performs Strong Rank Revealing QR on the panels to choose the pivot rows. LU_PRR is more stable than Gaussian elimination with partial pivoting (GEPP), with a theoretical factor growth upper bound of $(1 + 2b)^{\frac{n}{b}}$, where b is the size of the panel used during the factorization. Our extensive numerical experiments show that the new pivoting scheme is as numerically stable as GEPP but is more resistant to pathological cases such as the Kahan matrix.

We also present CALU_PRR, a communication avoiding version of LU_PRR that is optimal in terms of communication. As the CALU algorithm, this algorithm is based on tournament pivoting, but leads to a more stable algorithm than CALU in terms of factor growth.