



# CSC Seminar

## SPEAKER

**Xiaobo Liu**

## TITLE

**Mixed-precision iterative refinement for the low-rank Lyapunov equation**

## ABSTRACT

We investigate the use of mixed precisions in an iterative refinement framework for solving low-rank Lyapunov matrix equations  $AX + XA^T + C^TC = 0$ , where the sign function method with Newton iteration is used as the solver. The Newton solver is improved by combining the two Newton iterations for solving the correction equations into one, which halves the computational cost. We also propose a mixed-precision rank-truncation scheme based on the QR factorization with column pivoting. The quality of the solutions computed by the mixed-precision algorithm is verified by various numerical experiments, which suggest that reduced precisions, such as the half precision, can be exploited to accelerate the solution of Lyapunov equations that are well conditioned in relation to the solver precision.

Tuesday, March 25, 2025 at 2 pm  
seminar room Prigogine