Matrix Computations & Scientific Computing Seminar

Organizer: James Demmel & Ming Gu

Wednesday, 11:00am–12:00pm, 380 Soda

May 4   **Takeshi Iwashita**, Kyoto University, Japan
Hybrid parallel ordering method for a parallelized multiplicative Schwarz smoother in a multigrid solver for time-harmonic electromagnetic field problems

This research investigates large-scale parallel time-harmonic electromagnetic field analysis based on the finite element method. The parallel geometric multigrid preconditioned iterative solver for the resulting linear system was developed on a cluster of shared memory parallel computers. We propose a hybrid parallel ordering method for the parallelization of a multiplicative Schwarz smoother, which is a key component of the multigrid solver for electromagnetic field analysis. The method, using domain decomposition ordering for multi-process parallelism and introducing block multi-color ordering for multi-thread parallel processing, attains a high convergence rate with a small number of message passing interface communications and thread synchronizations. The numerical test confirms that the proposed method attains a solver performance more than twice as good as the method based on multi-color ordering. Furthermore, an approximately 800 million degrees of freedom problem is successfully solved on 256 quad-core processors.