

Integrative Computational Studies Seminar Series

A Parallel Hybrid Linear System Solver

Maxim Naumov
Wednesday, April 1, 2009
4:00 pm - 5:00 pm
LWSN 3102A/B

Abstract

Many simulations in computational science and engineering give rise to large sparse linear systems. The solution of these linear systems can be done using direct or iterative methods. In this presentation we describe a parallel hybrid approach that combines these two methods. It consists of the following general steps. First, the linear system is reordered into a (sparse within the band) banded form. This can often be achieved by weighted spectral or reverse Cuthill-McKee reordering scheme. Second, the system is partitioned as a set of overlapped diagonal blocks. These blocks are all dependent on a small balance system, which is not formed explicitly, but can be solved via a modified preconditioned iterative scheme that requires the direct solution of those individual diagonal blocks. Once the balance system is solved the overall solution is retrieved with almost perfect parallelism. Numerical experiments will be presented.