

TEMPLE UNIVERSITY  
Department of Mathematics

# Applied Mathematics and Scientific Computing Seminar

Room 617 Wachman Hall

Wednesday, 14 October 2009, 4:00 p.m.

## Algorithms for Fast Graph Partitioning and Applications to Preconditioning

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### **Abstract.**

The PABLO family is a collection of algorithms for fast graph partitioning, suitable for obtaining block based preconditioners like block Gauss-Seidel for the solution of linear systems. A new member of this family, called UPABLO (Unsymmetric PArametrized Block Ordering), based on different graph models is presented. Whereas the traditional PABLO algorithms are all based on the directed graph of a matrix, UPABLO considers instead its bipartite graph. The relationship between the bipartite graph and the hypergraph of a matrix will be explored. Furthermore, UPABLO can be combined with previous work on adding overlap to an existing non-overlapping partitioning. We present a complexity analysis of our algorithms. Numerical experiments prove that adding some overlap is usually very beneficial. Moreover, the results of extensive numerical tests will be presented to show how UPABLO-based preconditioners perform and how their performance compare to XPABLO-based preconditioners.