Department of Mathematics

University of Houston

Scientific Computing Seminar

Professor Sabine Le Borne Tennessee Technological University (on leave) National Science Foundation (ComputationalMathematics Program, 2011-2012) Technical University Hamburg-Harburg (beginning 9/2012)

Hierarchical matrices: a brief history and some applications in numerical PDEs

Thursday, April 19, 2012 3:00 PM- 4:00 PM Room 646 PGH

Abstract:

Hierarchical (\mathcal{H} -) matrices, first introduced in 1999 by W. Hackbusch, provide a data-sparse technique for the storage and arithmetic of dense matrices. In this talk, we begin with a brief history of the development of \mathcal{H} -matrix techniques. By now, the \mathcal{H} -matrix arithmetic has reached a relatively mature state, and \mathcal{H} -matrix techniques are entering into an increasing number of application fields.

Here, we will exploit \mathcal{H} -matrices for the numerical solution of partial differential equations. Whereas \mathcal{H} -matrix preconditioners such as approximate \mathcal{H} -inverses or \mathcal{H} -LU factorizations could be computed in an entirely blackbox manner, it is usually advantageous to include information that is specific to the application or even discretization at hand. We will illustrate this distinction between blackbox and problem-specific \mathcal{H} -matrix preconditioners for two examples: 1) the Oseen problem, and 2) higher-order FE discretizations of scalar PDEs.

This seminar is easily accessible to persons with disabilities. For more information or for assistance, please contact the Mathematics Department at 743-3500.