



Seminar Series in Applied Mathematics

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Computations with Dense Structured Matrices and Fast Algorithms

Tuesday, October 31, 2000

3:15 pm

Morton 103

Abstract: Computation with $n \times n$ dense structured matrices are highly important in sciences, communication and engineering. The space and time complexity of the computations decreases in comparison with the case of $n \times n$ general matrices. Exploitation of the structure enables dramatic acceleration of the computations and major decrease of the memory space constraints but sometimes this also leads to numerical stability problems.

The best known and most celebrated classes of structured matrices are Toeplitz and Hankel, but some other classes of structured matrices, such as ones of Cauchy and Vandermonde types, are also quite popular and are gaining more and more recognition. In particular, Cauchy and Cauchy-like matrices appear in applications to rational interpolation and rational matrix (tangential) interpolation, conformal mapping, and numerical solution of integral equations and have special structure naturally defined in terms of the associated scaling operators.

I will present a superfast Cauchy-like linear solver for any nonsingular Cauchy-like linear system of equations. The algorithm is an extension of the well-known divide-and-conquer (MBA) algorithm, and every recursive divide-and-conquer step can be reduced to Trummer's celebrated problem, for which we have some generalization of Fast Multipole Algorithm.

Refreshments will be available starting at 3:00pm.

For additional information contact Patrick Miller (216-5452) or Yi Li (216-5433).
