Special
APPLIED MATHEMATICS COLLOQUIUM

THE SNAP-BACK PIVOTING METHOD FOR SYMMETRIC BANDED INDEFINITE MATRICES

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ABSTRACT:

The four existing stable factorization methods for symmetric indefinite pivoting (row or column exchanges) maintains a band structure in the reduced matrix and the factors, but destroys symmetry completely once an off-diagonal pivot is used. Two-by-two block pivoting maintains symmetry at all times, but quickly destroys the band structure. Gaussian reduction to tridiagonal also maintains symmetry but destroys the band structure. Orthogonal reductions to tridiagonal maintain both symmetry and the band structure, but are too expensive for linear-equation solvers. We propose a new pivoting method, which we call snap-back pivoting. When applied to banded symmetric matrices, it maintains the band structure (like partial pivoting does), it keeps the reduced matrix symmetric (like 2-by-2 pivoting and reductions to tridiagonal) and the factors mostly symmetric (unlike any previous method), and it is fast. In snap-back pivoting, if the next diagonal element is too small, the next pivoting step might be unsymmetric, leading to unsymmetry in the next row and column of the factors. But both the reduced matrix and the factors snap back to symmetry once the next step is completed.

THURSDAY, FEBRUARY 17, 2005
4:00 PM
Building 2, Room 338

Refreshments at 3:30 PM in Building 2, Room 349.

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