Dissertation Defense

Numerical Solution of the k-Eigenvalue Problem

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Abstract: The k-eigenvalue problem is a generalized eigenvalue problem relevant to the design and analysis of nuclear reactors. The availability of robust and efficient solvers for this problem is an area of active interest in the nuclear engineering community and improved methods may lead to more efficient reactor designs. In this talk we present a survey of existing numerical strategies and offer a new framework based on the Davidson eigensolver which circumvents many standard difficulties. A multigrid-in-energy preconditioner is developed for use with the Davidson method as an alternative to the expensive matrix inversions that must typically be performed. Numerical results using the NEWT radiation transport code provide a comparison between several leading methods and demonstrate the effectiveness of this new approach.

Tuesday, March 15, 2011, 4:00 pm
Mathematics and Science Center: W303

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