Numerical Analysis and Scientific Computing Seminar

On an Eigenvector-Dependent Nonlinear Eigenvalue Problem

Ren-Cang Li

University of Texas at Arlington

Abstract: We first establish existence and uniqueness conditions for the solvability of an algebraic eigenvalue problem with eigenvector nonlinearity. We then present a local and global convergence analysis for a self-consistent field (SCF) iteration for solving the problem. The well-known sin? theorem in the perturbation theory of Hermitian matrices plays a central role. The near-optimality of the local convergence rate of the SCF iteration is demonstrated by examples from the discrete Kohn-Sham eigenvalue problem in electronic structure calculations and the maximization of the trace ratio in the linear discriminant analysis for dimension reduction.

This is a joint work with Yunfeng Cai (Peking University), Lei-Hong Zhang (Shanghai University of Finance and Economics), Zhaojun Bai (University of California at Davis).

Friday, April 5, 2019, 2:00 pm

Mathematics and Science Center: W301

Mathematics

Emory University