Localizing Ritz Values for Eigenvalue Computations

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To approximate the spectrum of a differential operator, one often seeks a few eigenvalues of a large discretization matrix. Variants of the Arnoldi algorithm are favored methods for computing these eigenvalues, but the convergence of these iterations is difficult to analyze for non-self-adjoint operators. They key challenge is to understand how Rayleigh-Ritz eigenvalue estimates are distributed in the field of values. We will describe recent progress on this challenge (and the related "inverse field of problem") and implications for convergence of the restarted Arnoldi method.