The Secular Equation: Another Golden Bridge Between Polynomial and Structured Matrix Computations

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The computation of the eigensystem of Hermitian/unitary matrices perturbed by a low rank update is a task of critical importance in many disciplines. The reduction of the modified eigenvalue problem to solving the associated "secular equation", as popularized by Gene Golub since the early 70's, is a way to capture the structure of the matrix problem that leads to stable and efficient algorithms. This talk presents an overview of the very recent progresses on these topics together with some applications to polynomial and structured matrix computations.