

# İSTANBUL ANALYSIS SEMINARS

## NONLINEAR EIGENVALUE PROBLEMS WITH SPECIFIED EIGENVALUES

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**Abstract:** Nonlinear eigenvalue problems have drawn substantial interest in the last two decades in numerical analysis. An important concept regarding them is the backward error, that is how much one has to perturb them so that a specified scalar becomes an eigenvalue. Here we consider the following more general question: given an analytic matrix-valued function, where is a nearest one possessing a set of prescribed eigenvalues located? We derive a singular value optimization characterization for such nearest matrix-valued functions with respect to the operator norm induced by  $\ell_2$ -norm. Our derivation benefits from the root canonical form for a nonlinear eigenvalue problem (generalization of the Jordan canonical form), generalized Sylvester operators, as well as tools from complex analysis.

This is a joint work with Michael Karow and Daniel Kressner.

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