

Interconnected systems with uncertain couplings:
explicit formulae for μ -values, spectral value sets and
stability radii

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Abstract:

We study the variation of the spectrum of block-diagonal systems under perturbations of compatible block structure with fixed zero blocks at arbitrarily prescribed locations (“Gershgorin type perturbations”).

We derive explicit and computable formulae for the associated μ -values. The results are then applied to characterize spectral value sets and stability radii for such perturbed systems. By specializing our results to the scalar diagonal case the classical eigenvalue inclusion theorems of Gershgorin, Brauer and Brualdi are obtained as corollaries. Moreover it follows that the inclusion regions of Brauer and Brualdi are optimal for the corresponding perturbation structures.