A sin 2θ Theorem for Graded Indefinite Hermitian Matrices

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ABSTRACT

This paper gives double angle theorems that bound the change in an invariant subspace of an indefinite Hermitian matrix in the graded form $H = D^* AD$ subject to a perturbation $H \to \tilde{H} = D^* (A + \Delta A) D$. These theorems extend recent results on a definite Hermitian matrix in the graded form (Linear Algebra Appl., 311 (2000), 45-60) but the bounds here are more complicated in that they depend on not only relative gaps and norms of $\Delta A$ as in the definite case but also norms of so-called the hyperbolic eigenvector matrices of certain associated matrix pairs. For two special but interest cases, bounds on these hyperbolic eigenvector matrices are obtained to show that their norms are of moderate magnitude.