On a Subspace Perturbation Problem

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Let A and V be bounded self-adjoint operators on a separable Hilbert space. Assume that the spectrum of A consists of two disjoint parts Δ and Σ such that $\operatorname{dist}(\Delta, \Sigma) > 0$. Denote by $\{P(s)\}$ the real analytic family of spectral projections of $A+sV$ uniquely determined by the requirement that $P(0)$ is the spectral projection of A associated with the set Δ. Under various assumptions on the perturbation V and mutual disposition of the sets Δ and Σ we obtain (optimal) sufficient conditions on the magnitude of the coupling constant $s \in \mathbb{R}$ that ensure the strict inequality $\|P(s) - P(0)\| < 1$.

This is a joint work with V. Kostrykin and A. K. Motovilov.