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Nullity and deficiency of linear relations under certain perturbations*

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Abstract. Let $\mathcal{A}$ and $\mathcal{B}$ be two closed linear relations acting between two Banach spaces X and Y and let λ be a complex number. We study the behavior of the nullity and deficiency of $\mathcal{A}$ when perturbed by $\lambda\mathcal{B}$.

In particular, we show the existence of a constant $\rho > 0$ for which both the nullity and deficiency of $\mathcal{A}$ do not remain constant when $\mathcal{A}$ is perturbed by $\lambda\mathcal{B}$ for all λ inside the disk $|\lambda| < \rho$. It turns out, however, that these quantities do not depend on λ in the specified disk, that is, both the nullity and deficiency of $\mathcal{A} - \lambda\mathcal{B}$ are uniform on the specified disk.

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