Geometric conditions which imply compactness of the $\overline{\partial}$-Neumann operator

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Abstract

On locally convexifiable domains, and on smooth bounded pseudoconvex Hartogs domains in $\mathbb{C}^2$, the $\overline{\partial}$-Neumann operator is compact if and only if the domain satisfies property(P) or equivalently, on these domains, McNeal's more recent property$(\widetilde{P})$. On general domains, it is not understood how much room there is, if any, between property$(\widetilde{P})$ and compactness. It is therefore important to have an approach to compactness that does *not* proceed via verifying property$(\widetilde{P})$. This paper presents such an approach in the context of domains in $\mathbb{C}^2$. Moreover, this approach yields simple geometric conditions which imply compactness that are essentially minimal: modulo the particular form of a certain lower bound in one of the conditions, they are necessary for compactness.