Morris, Andrew (University of Birmingham, United Kingdom)

Quadratic estimates for Hodge–Dirac operators with L^p-singular potentials

Abstract: We establish new quadratic estimates for additive perturbations of first-order elliptic systems, such as the perturbed Hodge–Dirac operator $D = (d + W_1) + (d^* + W_2)B$, with singular potentials W_1 and W_2 in $L^p(\mathbb{R}^n)$, and an accretive perturbation B in $L^\infty(\mathbb{R}^n)$. The homogeneous estimates require a substantial reworking of existing techniques and the potentials are required to be in $L^n(\mathbb{R}^n)$ with sufficiently small norm. The inhomogeneous estimates, however, follow a more straight-forward perturbation argument that permits potentials in $L^p(\mathbb{R}^n)$ for any $p \geq n$. The solution of the Kato square-root problem and the solvability of boundary value problems for magnetic Schrödinger systems follow as applications.