THOMAS RANSFORD, Université Laval

Double-layer potentials, configuration constants and applications to numerical ranges

We consider estimates $\|p(T)\| \leq K \sup_{z\in\Omega} |p(z)|$, where T is a Hilbert-space operator, p is a polynomial and Ω is a compact convex set containing the numerical range of T. We show that the well-known Crouzeix–Palencia bound $K \leq 1+\sqrt{2}$ can be improved to $K \leq 1+\sqrt{1+a(\Omega)}$, where $a(\Omega)$ is what we call the analytic configuration constant of Ω. The latter is an analytic analogue of the classical configuration constant $c(\Omega)$ arising in the theory of double-layer potentials. A celebrated result of Neumann, dating back to 1877, states that $c(\Omega) < 1$ unless Ω is a triangle or a quadrilateral. Among other results, we prove that, in our case, we always have $a(\Omega) < 1$. Consequently, equality never holds in the Crouzeix–Palencia bound. (Joint work with Bartosz Malman, Javad Mashreghi and Ryan O'Loughlin.)