Interval Analysis Methods for Elliptic Boundary Value Problems

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This talk focuses on the successful implementation of methods rooted in Interval Analysis and Harmonic Analysis for deriving well-posedness results for elliptic boundary value problems in the class of curvilinear polygons in two dimensions, equipped with Dirichlet, Neumann, regularity, and/or mixed boundary conditions.

A key step in this approach is to establish explicit characterizations of the spectra of singular integral operators naturally associated with the problem in question. This analysis is also relevant to the spectral radius conjecture, cf., e.g., Problem 3.2.12 in C.E. Kenig's 1994 book "Harmonic Analysis Techniques for Second Order Elliptic Boundary Value Problems".

This is based on joint work with H. Awala, T. Johnson, K. Ott and W. Tucker.