Boundary Value Problems: Higher Order Regularity Data in Nonsmooth Settings

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ABSTRACT: Methods based on pseudodifferential calculus have proved vastly successful in dealing with boundary value problems in smooth domains, but they have the drawback of crucially relying on smoothness. At the other end of the spectrum, with the advent of the modern Calder'on-Zygmund theory of singular integral operators, the theory of elliptic boundary value problems in Lipschitz domains has presently reached a remarkable degree of sophistication. One issue left unresolved at the present time is reconciling these existing theories (dealing, respectively, with very smooth and very irregular geometries) by developing a theory which contains the aforementioned ones as limiting end-points. This talk will partially address this issue by focusing on the solvability via boundary integral methods of the Dirichlet problem for elliptic systems under optimal geometric measure theoretic assumptions and with boundary data belonging to higher order Sobolev spaces.