End-point boundary value problems in rough domains

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Abstract

Lately, considerable success has been registered in the implementation of the method of layer potentials in the treatment of boundary value problems in classes of domains whose boundaries may not be locally described as graphs. In my talk I will report on such recent progress for elliptic PDE's with special emphasis on the Neumann problem with data in Hardy spaces, and the Dirichlet problem with data in BMO.

These basic BVP's are considered in the class of chord-arc domains with an appropriately small constant, and some of the key issues underscoring the solvability of the aforementioned problems are: a suitable grand-maximal function characterization of Hardy spaces in rough settings, an extension of the classical De Georgi-Federer Divergence theorem, a suitable version of Fredholm theory for boundary integral operators of potential type in Hardy and BMO spaces, and square-function estimates on uniformly rectifiable sets.

Various portions of the work reported on are joint collaborations.