Square function estimates and applications to PDE's in rough domains

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Abstract: The topic of square function estimates (SFE) has played a basic role in harmonic analysis and partial differential equations. This has originated in the context of complex function theory but subsequent work has brought to prominence the role of real-variable techniques, which made it possible to considerably extend the applicability range to much more general settings. In the first part of my talk I will discuss some recent progress, based on joint work with S. Hofmann, D. Mitrea, and A. Morris, in which conditions equivalent to SFE are given in the general setting of spaces of homogeneous type, as well as on uniformly rectifiable sets in $\mathbb{R}^n$. In the second part of my talk I will then explain the role of such SFE in the solution of elliptic boundary value problems, via layer potentials, formulated in multidimensional chord-arc domains with small constant.