

TEMPLE UNIVERSITY

Department of Mathematics

Analysis Seminar

Room 617 Wachman Hall

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Inverting double layers on Lebesgue spaces on the boundary of Lipschitz domains

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Double layers arise naturally in connection with boundary value problems (BVPs) for second order elliptic operators with datum in Lebesgue spaces on the boundary of the domain in question. In fact the solvability of the Dirichlet and Neumann problems hinges on the ability of inverting an operator of the type $\frac{1}{2}I + T$ on L^p , where T is of double layer type.

The first part of the talk will be focused on the key tool for inverting such operators on L^2 , namely Rellich type identities/estimates. Concretely, we shall show the equivalency of the L^2 norms for the tangential gradient and the normal derivative of a harmonic function in a Lipschitz domain, whose gradient has a square integrable non-tangential maximal function. In the context of Lipschitz domains, Rellich estimates have been used first by G. Verchota in his Ph.D. thesis to treat BVPs for the Laplacian.

In the second part, I will present a two-dimensional mechanism inspired by the work of M. Riesz which allows us to establish invertibility on L^p for each $p \in [2, \infty)$.