TEMPLE UNIVERSITY

Department of Mathematics

Analysis Seminar

Room 617 Wachman Hall

Monday, October 23rd, 2023, 2:30 p.m.

The Rellich Identity: Applications in PDEs and Harmonic Analysis

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Abstract: In 1940, F. Rellich introduced an integral identity while studying the Dirichlet eigenvalue problem for the Laplace operator. This identity, nowadays known as the *Rellich identity*, plays fundamental roles in questions on elliptic partial differential equations. In this talk, we will discuss two of its applications within the context of the Neumann problem in Lipschitz domains. The first application deals with the invertibility of certain singular operators from potential theory, proved by G. Verchota (1984) for bounded domains and subsequently extended to graph domains by C. Kenig (1985). In the second part of the talk, we will present a new application of the Rellich identity in Harmonic Analysis, involving the Hilbert transform and some "special" weights arising from conformal maps. This is joint work with M. J. Carro (Universidad Complutense de Madrid) and V. Naibo (Kansas State University).