TEMPLE UNIVERSITY

Department of Mathematics

Analysis Seminar

Zoom meeting

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On Model Operators in Singular Analysis

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Abstract: A common theme in PDEs is to exploit invariance properties with respect to scaling of equations. This leads to fundamental solutions, the heat kernel, as well as the notion of principal symbol. Perturbation theory is then used to derive qualitative results for more general equations, where the dominant scaling-invariant pieces are the principal parts on which invertibility assumptions (ellipticity conditions) are placed. While invertibility of the principal symbol of an elliptic operator governs certain qualitative properties of the equation locally, additional conditions are required to determine well-posedness and regularity on spaces with noncompact ends, and especially on manifolds with incomplete geometry such as boundaries and singularities (i.e. one needs to impose boundary conditions). There are operator-valued analogues of the principal symbol of the operator that are associated with the boundaries and singularities that govern the behavior of solutions and the conditions to be placed on them for the equation. These dominant terms again exhibit certain top-order homogeneity properties, i.e., scaling invariance in a suitable sense, and are sometimes referred to as model operators. In this talk I will speak about model operators from a purely functional analytic perspective. We will obtain several results, some previously known in special cases, as well as new ones as consequences of generic functional analytic properties.