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The anisotropic Calderón problem for warped product metrics of singular type: the borderline between uniqueness and invisibility

We investigate the anisotropic Calderón problem on cylindrical manifolds having two ends, and equipped with singular metrics of (simple or double) warped product type, that is whose warping factors depend only on the horizontal direction of the cylinder. The warping factors are only assumed to be belong to some L_p space with $p < 0 \leq \infty$. Using recent developments on the Weyl-Titchmarsh theory for singular Sturm-Liouville operators, we prove that the local Dirichlet-to-Neumann maps at each end are well-defined and determine the metric uniquely if 1. (doubly warped product case) the coefficients of the metric are L_∞ and bounded below by a positive constant. 2. (warped product case) the coefficients of the metric belong to a critical L_p space where p depends only on the dimension of the compact fibers of the cylinder. Finally we show (in the warped product case and for zero frequency) that these uniqueness results are sharp by giving simple counterexamples for a class of singular metrics whose coefficients do not belong to the critical L_p space. All these counterexamples lead to a region of space that is not visible to boundary measurements.
This is joint work with Thierry Daudé (Cergy-Pontoise) and Francois Nicoleau.