Inverse Problem for the Minimal Surface Equation and

Nonlinear CGO Calculus in Dimension 2

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We present our recent results regarding inverse problems for the minimal surface equation. Applications of the results include generalized boundary rigidity problem and AdS/CFT correspondence in physics. Minimal surfaces are solutions to a quasilinear elliptic equation. We determine a minimal surface up to an isometry from the corresponding Dirichlet-to-Neumann map in dimension 2.

We develop a nonlinear calculus for complex geometric optics solutions (CGOs) to handle numerous correction terms that appear in our analysis. We expect the calculus to be applicable in inverse problems for other nonlinear elliptic equations in dimension 2 as well. The talk is based on a joint work with Catalin Carstea, Matti Lassas and Leo Tzou.

References:
[1] An inverse problem for general minimal surfaces, Cătălin I. Cârstea, Matti Lassas, Tony Liimatainen, Leo Tzou, https://arxiv.org/abs/2310.14268, (2023).