

数学与系统科学研究院

计算数学所学术报告

报告人: **Prof. Maarten V. de Hoop**

(*Rice University, USA*)

报告题目:

**Spectral rigidity for spherically
symmetric manifolds with boundary**

邀请人: 张文生 研究员

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下午 16:00-17:00

报告地点: 数学院南楼二层

212 教室

Abstract:

We characterize the spectrum of terrestrial planets. We then establish spectral rigidity for spherically symmetric Riemannian manifolds with boundary. We require the so-called Herglotz condition while allowing an unsigned curvature; that is, curvature can be everywhere positive or it can change sign, and we allow for conjugate points. Spherically symmetric manifolds with boundary are models for planets, the preliminary reference Earth model (PREM) being the prime example. Specifically, restricting to toroidal modes, our spectral rigidity result determines the shear wave speed of Earth's mantle in the rigidity sense.

We prove a trace formula for three-dimensional spherically symmetric Riemannian manifolds with boundary: The wave trace is singular precisely at the length spectrum of periodic broken rays. In particular, the Neumann spectrum of the Laplace–Beltrami operator uniquely determines the length spectrum. We then prove that the length spectrum is rigid: Deformations preserving the length spectrum and spherical symmetry are necessarily trivial in any dimension, provided the Herglotz condition and a generic geometrical condition are satisfied. Combining the two results shows that the Neumann spectrum of the Laplace–Beltrami operator is rigid in this class of manifolds with boundary. We will then indicate how to include interior discontinuities and discuss computational aspects.

Joint research with Joonas Ilmavirta and Vitaly Katsnelson.

欢迎大家参加！