Peter Herbrich
On Inaudible Properties of Broken Drums - Isospectral Domains with Mixed Boundary Conditions

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Since Kac raised the question "Can one hear the shape of a drum?", various families of non-smooth counterexamples have been constructed using the transplantation method which is based on a group-theoretic technique by Sunada. We apply the transplantation method to domains with mixed boundary conditions which can be interpreted as broken drums. The method is translated into graph theory which allowed for a computer-aided search for transplantable pairs, a classi□cation in terms of induced representations, and the development of tools with which new pairs can be generated from given ones. The talk fi□nishes with a presentation of various new pairs among which here are 10 versions of the Gordon-Webb-Wolpert drums with mixed boundary conditions. In the end, we discuss inaudible properties and show the □rst example of a connected drum that sounds disconnected and of a broken drum that sounds unbroken, that is, a planar domain with mixed boundary conditions that is isospectral to a domain with Dirichlet boundary conditions. Above all, the latter example shows that an orbifold can be Dirichlet isospectral to a manifold.

Kontakt:
Humboldt-Universität zu Berlin . Institut für Mathematik
SFB 647 . Unter den Linden 6 . 10099 Berlin
Tel. +49 30 2093 1804 . Fax. +49 30 2093 2727
sfb647@math.hu-berlin.de