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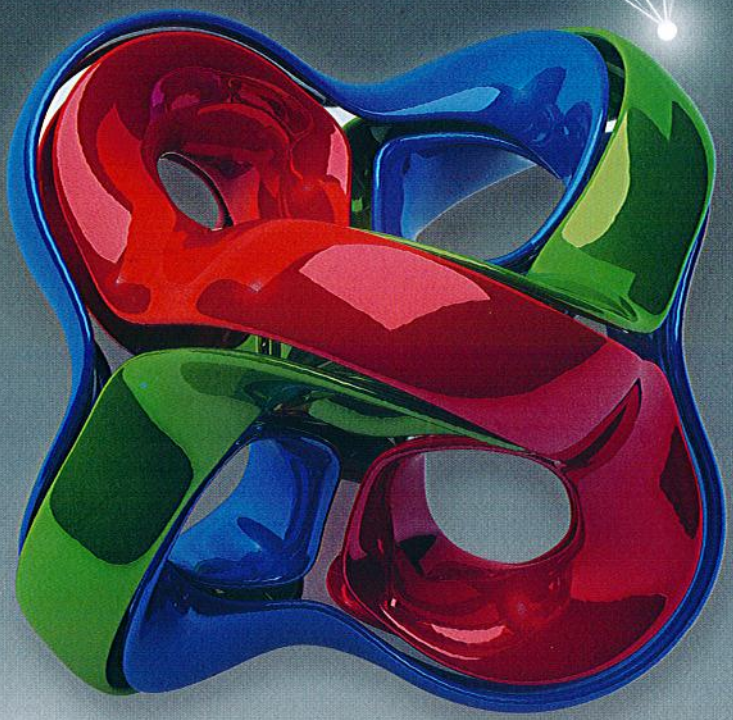

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14 SMAK

SERBIAN MATHEMATICAL CONGRESS

BOOK OF ABSTRACTS

Transmission eigenvalues, discreetness and existence

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The interior transmission problem, which arises in inverse inverse scattering theory, is a boundary value problem compounded of two partial differential equations of second order defined in a bounded domain that corresponds to the scatterer. The boundary value problem is not elliptic in the sense of Agmon-Douglas-Nirenberg so the classical theory of PDE does not provide a direct answer for its solvability. Its homogeneous version is referred to as the transmission eigenvalue problem, which is nonlinear and non self-adjoint eigenvalue problem. In this paper the focus is to prove descretness and existence of real transmission eigenvalues of the following problem

$$\begin{aligned} \Delta w + k^2 n w &= 0 && \text{in} && \Omega, \\ \Delta v + k^2 v &= 0 && \text{in} && \Omega, \\ w - v &= -\eta \frac{\partial v}{\partial \nu} && \text{on} && \partial\Omega, \\ \frac{\partial w}{\partial \nu} &= \frac{\partial v}{\partial \nu} && \text{on} && \partial\Omega. \end{aligned}$$

This transmission eigenvalue problem, which appears in the analysis of inverse scattering problem for an inhomogeneous media with thin coating, has not been studied in the existing literature. It presents additional difficulties due to more complicated boundary conditions. Establishing the discreetness of transmission eigenvalues is important in order to prove the solvability of the interior transmission problem, since the latter satisfies the Fredholm Alternative. On the other hand the existence of real transmission eigenvalues, which is much harder question due to non-selfadjointness, is important for solving the inverse scattering prob-

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L^2-type exponentiality tests based on V-empirical Laplace transform and Puri-Rubin characterization

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In this paper we propose new goodness-of-fit tests that employ the equidistribution characterization of the exponential distribution due to Puri and Rubin. Based on V-empirical Laplace transforms of equidistributed statistics, test statistics of L^2-type are constructed. They are degenerate V-statistics with estimated parameters. Their asymptotic properties are derived. To assess their quality, the approximate Bahadur efficiency is used. For small sample sizes, a simulated power study is performed. The tests are shown to be very efficient and powerful in comparison to many other exponentiality tests.

References

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