



ЮЖНЫЙ ФЕДЕРАЛЬНЫЙ УНИВЕРСИТЕТ
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SOUTHERN FEDERAL UNIVERSITY
Regional Mathematical Center
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International scientific online seminar on Analysis, Differential Equations and Mathematical Physics

Coordinators: Prof. Alexey Karapetyants, Prof. Vladislav Kravchenko

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Spectral properties of Dirichlet Laplacian in spiral-shaped regions

Pavel Exner, Doppler Institute for Mathematical Physics
and Applied Mathematics, Czech Republic,
exner@ujf.cas.cz

The talk is concerned with spectral properties of Laplace operator in a spiral-shaped region with Dirichlet boundary. As a case study we analyze in detail the region corresponding to the Archimedean spiral and show that the spectrum above the continuum threshold is absolutely continuous away from the thresholds. The subtle difference between the radial and perpendicular width implies, however, that in contrast to numerous examples of ‘less curved’ waveguide-type systems, the discrete spectrum is empty in this case.

We also discuss modifications such a multi-arm Archimedean spirals and spiral waveguides with a central cavity; in the latter case bound state already exist if the cavity exceeds a critical size. For spiral regions of a more general type the spectral nature depends substantially on whether their coil width is ‘expanding’ or ‘shrinking’. The most interesting situation occurs in the case we call asymptotically Archimedean, where the existence of bound states depends on the direction from which the asymptotics is reached.

*Seminar website: <https://rmc.sfedu.ru/seminar>. The seminar uses Microsoft Teams online platform.
To join the seminar, please send a request to pichugina@sfedu.ru (Olga Pichugina, scientific secretary).

The seminar is organized by the Regional Mathematical Center of the Southern Federal University in collaboration with Institute of Mathematics, Mechanics and Computer Sciences of the Southern Federal University and the special Interest ISAAC-OTHA group in Operator Theory and Harmonic Analysis.

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Южный Федеральный Университет
Ростов-на-Дону

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