INTERNATIONAL BIWEEKLY ONLINE SEMINAR ON ANALYSIS, DIFFERENTIAL EQUATIONS AND MATHEMATICAL PHYSICS

Coordinators: Prof. Alexey Karapetyants, Prof. Vladislav Kravchenko

JOIN THE SEMINAR

26 November 2026, 6 pm (UTC+3)

Beyond Graphene Hamiltonians: Spectral Properties of Hexagonal Quantum Graphs

Burak Hatinoglu, University of Georgia, USA

burak.hatinoglu25@uga.edu

We will discuss two extensions of the graphene Hamiltonian on the hexagonal lattice. The first involves periodic Schrödinger operators with self-adjoint vertex conditions allowing discontinuities and concentrated masses at the vertices. The second concerns fourth-order differential operators arising in models of elastic beam lattices, where the vertex conditions depend on the geometry of the underlying graph.

Using Floquet–Bloch theory, we investigate the dispersion relations and spectral properties of these Hamiltonians. We also discuss how modifications of the differential operators, vertex conditions, and lattice geometry influence the spectral structure, including the formation of spectral gaps.

The talk is based on joint works with Mahmood Ettehad.

*Seminar website: https://msrn.sfedu.ru/sl. The seminar uses Microsoft Teams online platform.
Please send questions to ademp.seminar@gmail.com (Tatiana Andreeva, scientific secretary).

The seminar is organized by the coordinators Alexey Karapetyants and Vladislav Kravchenko within the activities of 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 OTHA research group in Operator Theory and Harmonic Analysis.

Regional Mathematical Center
https://rmc.sfedu.ru/

Institute of Mathematics, Mechanics and Computer Sciences
http://www.mmcs.sfedu.ru/

OTHA research network in Operator Theory and Harmonic Analysis
http://msrn.sfedu.ru/