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

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Wigner kernels of operators: controlling ghost frequencies

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The integration of operator kernels with the Wigner distribution, first conceptualized by E. Wigner in 1932 and later extended by L. Cohen and others, has opened new avenues in time-frequency analysis and operator calculus. Despite substantial advancements, the presence of "ghost frequencies" in Wigner kernels continues to pose significant challenges, particularly in the analysis of Fourier integral operators (FIOs) and their applications to partial differential equations (PDEs).
In this talk, we build on the foundational concepts of Wigner analysis to introduce a novel framework for controlling ghost frequencies through combined Gaussian and Sobolev regularization techniques. By focusing on FIOs with non-quadratic phase functions, we develop rigorous estimates for the Wigner kernels that are crucial for their applicability to Schrödinger equations with non-trivial symbol classes. Unlike previous approaches, our methodology not only mitigates the interference caused by ghost frequencies but also establishes robust bounds in the context of generalized symplectic mappings. This is a joint work with Elena Cordero and Gianluca Giacchi [1].

1. E. Cordero, G. Giacchi, and L. Rodino. Wigner analysis of operators. Part III: controlling ghost frequencies. arXiv:2412.01960

*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.

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