

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

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Coordinators: Prof. Alexey Karapetyants, Prof. Vladislav Kravchenko

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## On a new formulation of the inverse problem of determining the order of fractional derivatives in partial differential equations

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Determining the unknown order of a fractional derivative in differential equations modeling various processes is an important problem of modern applied mathematics. It is often difficult to determine the order of a fractional derivative directly, since there is no available measuring device. In such cases, it is necessary to solve the inverse problem, which consists in determining this parameter using indirectly observed information about the solutions. In the last decade, this problem has been actively studied by many specialists. A number of interesting results have been obtained that have a certain applied significance. Analyzing the known results, we can conclude that in all these works, firstly, only the subdiffusion equation was considered and, secondly, the authors managed to prove only the uniqueness of the solution to the inverse problem under consideration. This report will give a brief overview of the most interesting works in this area, and will also propose a new formulation and methods for solving these inverse problems. It will be proven that in the new formulation, the solutions to the inverse problems are not only unique, but also exist. In this case, not only the subdiffusion equations will be considered, but also the fractional-wave equation, the Rayleigh-Stokes equations and some mixed-type equations.

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

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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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