

# 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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## Convolution integro-differential equations on Lie groups, Generic Bessel Potential Spaces and fundamental solutions

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The purpose of the presentation is to discuss the convolution integro-differential equations on Lie groups and their applications to some equations of Mathematical Physics. In this framework we suggest to underline the role of Generic Bessel potential spaces (GBPS) to the structure of underlying Lie group. Definition of GBPS are based on generic differential operators from the Lie algebra associated to the Lie group. Such generic Bessel potential spaces are adapted better to the investigation of integro-differential (of pseudo-differential) operators on Lie groups.

We formulate necessary and sufficient condition for the Fredholm property (invertibility) of generic convolution integro-differential operators with constant coefficients on a commutative (Abelian) Lie group  $G$  in the Generic Bessel potential Spaces. (GBPS). Since for operators with elliptic symbol the inverse operator is available in explicit form, we indicate the fundamental solution of the above mentioned convolution integro-differential operator in elliptic case as the Hörmander's kernel of the inverse operator. With Fundamental solution at hands we are able to write Newtons, Single and Double layer potential operators in explicit form and derive formula for the representation of a solution to boundary value problems for generic differential equations with constant coefficients. This enables us to derive corresponding equivalent boundary pseudodifferential equation for the basic boundary value problems for a generic differential equations in a domain (potential theory on a Lie group).

\*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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