

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

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Fractional calculus with respect to functions: historical overview, transmutation relations, and generalizations

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The concept of fractional calculus with respect to functions (sometimes called psi-fractional calculus in recent years) arises naturally as a fractional version of the chain rule and Stieltjes integration. The resulting operators also provide a fractional version of the method of substitution in differential equations. Research on these operators and the associated differential equations has increased massively since 2017, but most researchers in the topic are unaware of its true history, and also unaware of the transmutation relations which are key in studying and understanding these operators. I will provide a historical overview ranging from Liouville and Holmgren in the 19th century up to Almeida and others in the 21st century. Inspired by the transmutation relations for fractional calculus with respect to functions, I will also show a more general way of considering transmutation relations in fractional calculus, leading to useful connections between different operators (greatly easing the process of studying these operators) as well as new types of operators.

*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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