

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

Coordinators: Prof. Alexey Karapetyants, Prof. Vladislav Kravchenko

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Quasi-Bessel equations: existence and hyper-dimensionality

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We introduce fractional quasi-Bessel equations

$$\sum_{i=1}^m d_i x^{\xi_i} D^{\alpha_i} u(x) + (x^\beta - \nu^2)u(x) = 0$$

and construct their existence theory in the class of fractional series solutions. In order to find the parameters of the series, we derive the characteristic equation, which is surprisingly independent of the terms with non-matching parameters $\xi_i \neq \alpha_i$. As a direct corollary, the method allows to analyze quasi-Euler and constant-coefficient equations and is applicable to the existence result for elliptic-like PDEs with fractional Cauchy-Euler operator. We also arrive at a hyper-dimensionality phenomenon for certain fractional differential equations possessing "too many" linearly independent solutions. The theoretical findings are justified computationally.

The results are obtained jointly with L. Boyadjiev and J. Slepoi.

References: Fract. Calc. Appl. Anal. 2021, 2022; J. Math. Sci. 2022.

*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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