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

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A Carleman Semi-Discrete Convexification Method Combined With Deep Learning for Electrical Impedance Tomography

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In this talk, a new semi-discrete version of the Carleman estimate-based convexification globally convergent numerical method is developed. It is used to provide a starting point for the training procedure of deep learning. An important feature of the continuous version of the convexification method is that its convergence to the true solution is independent of the availability of a good first guess. A new concept of h-strong convexity is introduced, where h is the grid step size in the semi-discrete version of the convexification method. The h-strong convexity enables an a priori accuracy estimate of the starting point for the deep learning training step. This approach is demonstrated for a highly nonlinear problem of Electrical Impedance Tomography. Results of numerical experiments for complicated media structures demonstrate the computational feasibility of this procedure.

*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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