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

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Travelling waves in strongly inhomogeneous media

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The classical problem of wave propagation in layered media, which is given much attention in the famous books by Brekhovskikh and Ginzburg is analysed. The main attention is paid to a new class of travelling waves in highly inhomogeneous media, which we called non-reflecting. It is shown that under special conditions on the medium parameters, it is possible to find traveling waves that are not reflected inside the layer. The characteristics of such non-reflecting media are described by nonlinear ordinary differential equations of the second order, so that the profiles of inhomogeneity are determined through several constants, and can approximate real distributions on sufficiently large areas. It is shown that such waves can be non-dispersive or dispersive, in the latter case, the low-frequency dispersion is due to the scale of the inhomogeneous medium. It is demonstrated that such non-reflecting waves can propagate in the atmosphere of the Earth and the Sun, on the surface of a water channel, in a stratified liquid, and in MHD waveguides. Contributors: Ekaterina Didenkulova and Ioann Melnikov.

*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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