Contribution ID: **1102** Type: **Oral**

Control problems for nonlinear models of heat and mass transfer

Monday 24 October 2022 15:00 (15 minutes)

Control problems for nonlinear models of heat and mass transfer of a viscous and viscous conducting fluid are studied. It is assumed that the coefficients in equations and boundary conditions of the considered models depend non-linearly on the substance concentration and on the temperature, as well as on spatial variables. Thus, the heat and mass transfer models used in this work generalize the Boussinesq approximation. Note that the applications of these problems are not narrowed to the search of effective mechanisms for controlling physical fields. In the framework of the optimization approach inverse problems are reduced control problems, where the first ones consist of restoring unknown functions in the equations and boundary conditions of considered models with the help of the additional information about the solution of boundary value problems (see, for example, [1,2]). The physical field controlling mechanisms include the modeling of cooling systems for nuclear reactors, controlled thermonuclear fusion, the creation of new underwater engines and the development of MHD generators.

The study was supported by a grant from the Russian Science Foundation No. 22-21-00271)

References

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Primary authors: SARITSKAIA, Zhanna; BRIZITSKII, Roman (Institute of Applied Mathematics FEB RAS)

Presenter: SARITSKAIA, Zhanna

Session Classification: Mathematical Modeling and Computational Physics

Track Classification: Mathematical Modeling and Computational Physics