应用数学讲座

Научный Семинар по Прикладной Математике

Research Seminar on Applied Mathematics

应用数学报告（50）

报告人 / Докладчик / Speaker: **Prof. Sergey Kabanikhin, Corresponding Member of Russian Academy of Sciences, Novosibirsk State University**

题目 / Название / Title: **Continuation problems: Theory and Numerics**

时间 / Время / Time：**23 Jul. 2022, 11:30-12:00**

地点 / Место / Venue: **Zoom ID: 462 476 1414**
Password: 777777

摘要 / Аннотация / Abstract:

We consider several numerical approaches for parameters identification of the medium. One of this is based on the continuation problems of physical fields with the data on the part of the boundary [1,2,3], which arise in Geophysics, tomography, in problems of protection of nuclear reactors. The second is the method based on the conservation laws and the solution of the coefficient inverse problems.

Continuation problems are ill-posed and we formulate this problems in the form of operator equation Aq=f, for which the minimization of the objective functional and the method of singular value decomposition [2,3] are applied.

We study the properties of the operator A and the algorithm of minimization of functional $J(q)=\|Aq-f\|^2$ by the conjugate gradient method. In series of numerical experiments are shown that it allows us to recover the boundary conditions on the inaccessible part of the boundary, as well as to obtain information about inhomogeneities (the number, location, approximate volume) located in the region of inaccessibility.

References:

[1] V. Isakov, S. Kindermann. Subspaces of stability in the Cauchy problem for the Helmholtz equation Methods and Applications of Analysis 18 (1), 1-30.

[2] S. I. Kabanikhin, Y. S. Gasimov, D. B. Nurseitov, M. A. Shishlenin, B. B. Sholpanbaev and S. Kasenov. Regularization of the continuation problem for elliptic equations. Journal of Inverse and Ill-Posed Problems. 2013. 21(6). Pp. 871-884.

[3] Kabanikhin S.I, Shishlenin M.A., Nurseitov D.B., Nursetova A.T., Kasenov S.E. Comparative analysis of methods for regularizing an initial boundary value problem for the Helmholtz equation. Journal of Applied Mathematics. 2014. Vol. 2014, 7 pages