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**SUMMARY**

of thesis on scientific degree of Doctor of Philosophy (PhD) in the specialty  
6D060100-Mathematics

**ISSUES OF SOLVABILITY FOR THE MIXED PARABOLIC-  
HYPERBOLIC EQUATIONS**

**Actuality of the theme.** The theory of equations of mixed type is one of the main sections of the modern theory of differential equations with partial derivatives. Interest in this question associated with both the theoretical significance of the results, and the identification of multiple applied problems, mathematical modeling, which leads to the study of various types of equations in the considered region of variation of independent variables.

For the first time in 1902 the importance of studying of mixed-type equations pointed Chaplygin in his paper "On the gas jets". The beginning of the study of boundary value problems for equations of mixed type was initiated in 1920-1930 y. in works Tricomi, S. Gellerstedt. A new impetus to the development of this theory was works of M.A. Lavrentyev, A.V. Bicadze, F.I. Frankl, M. Protter, C. Morawetz where along with theoretical research a number of substantial questions of this theory has been specified their practical significance also.

At present the concept of mixed-type equations significantly expanded and includes all the possible combinations of two or three classic types of equations. Intensive study of mixed parabolic-hyperbolic type equations due to the fact that, on the one hand, new types of mixed equations studied a little in theory, on the other hand, they are the basis of mathematical models of various natural phenomena.

Solvability questions of local and nonlocal boundary value problems for mixed parabolic-hyperbolic equations of second and third orders are studied intensively. However, despite the large amount of work in this area, the solvability of boundary value problems with integral transmission conditions for parabolic-hyperbolic equations of the second and third orders are still open. All of the above permits us to conclude that the subject of the thesis is relevant.

**Purpose of work.** The main purpose of this paper is a study and statement of regular and strong solvability issues of boundary value problems for hyperbolic and parabolic-hyperbolic equations of the second and third orders on the surface.

**Objectives of the study.** The main objectives of the study are:

- establishment of the strong solvability and Volterra property of analogue of the Tricomi problem with gluing integral conditions for mixed parabolic-hyperbolic equations of the second and third orders
- a study and statement of boundary value problems on a surface for a hyperbolic equation of the third order
- determination of the conditions of strong solvability for a class of boundary value problems with gluing integral conditions for mixed parabolic-hyperbolic equations.

**Scientific innovation.** The following results have been obtained:

- Proved strong solvability and Volterra property of an analogue of generalized Tricomi problem with gluing integral conditions for mixed parabolic-hyperbolic equation of the second order.
  - Proved the theorem on the existence of eigen values of a boundary value problem with a special gluing conditions for the mixed parabolic-hyperbolic equations.
  - Found the sufficient conditions of the solvability for a class of boundary value problems with gluing integral conditions for parabolic-hyperbolic equation of second order.
  - Proved a strong solvability of a number of local problems, including the Dirichlet problem for a hyperbolic equation of the third order.
  - Proved the unique solvability and Volterra property of an analog of the Tricomi problem with special gluing conditions for the mixed parabolic-hyperbolic equation of the third order.
  - Established the unique (regular and strong) solvability for a class of boundary value problems for mixed parabolic-hyperbolic equation of the third order.

**Methods of research.** Investigated boundary value problems are equivalent reduced to integral-functional equations. The methods of the theory of differential equations, the theory of functional equations are used.

**The theoretical and practical importance.** The results of the study primarily represent theoretical interest. They can be used in the theory of boundary value problems for a wide class of partial differential equations of hyperbolic type, as well as mixed and mixed-composite type, in the study of mathematical problems of many branches of mechanics and physics.

**Structure and volume of thesis.** The thesis consists of an introduction, three chapters, conclusion and list of used references of 72 items. The work is set out on 100 pages.