

ON PROBLEM OF CHOOSING CONVENIENT REDUCTION OF WAVE EQUATION TO EQUIVALENT FIRST ORDER SYSTEMS IN OPTIMAL CONTROL PROBLEMS¹

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There exist two approaches in studying controlled processes described by PDE of second and higher orders. The first approach is to deal with the optimal problem in terms of the existing equation. The second is to reduce the initial equation to a system of first order equations. In problems of optimal control of ordinary differential equations the second approach is far more popular. However, in optimal control of partial differential equations historically the first approach dominates. In multiple papers dedicated to Goursat-Darboux control problem it turned out that using the first approach the associated conjugate system can be written only in integral form. This fact makes it much more difficult to use this conjugate system in general study and numerical methods construction for the control problem.

The advantages of using the second approach were made clear in study of control problem of wave equation. Its reduction to a system of first order equations enabled us to introduce a clear and convenient concept of a generalized solution [1], to obtain the necessary optimality conditions [2], and numerical methods [3] for the stated problem.

The aim of the report is to generalize and develop further this approach.

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