INVESTIGATION OF THE NONLOCAL INITIAL-BOUNDARY VALUE PROBLEMS FOR THE STRING OSCILLATION AND TELEGRAPH EQUATIONS

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Abstract

The present article is devoted to the initial-boundary value problems with the so called nonlocal conditions, where, in contrast to classical initial-boundary value problems, there is given a certain relation between the boundary meanings of unknown function and its inherent ones. On the example of string oscillation and telegraph equations there are studied different types of nonlocal problems, proved existence and uniqueness theorems and given algorithms for direct construction of solutions. The mentioned problems could be interpreted as problems with boundary control, when maintenance of a certain link between boundary and inherent meanings of the unknown function is requested.

In order to solve the above problems we use the method of reflected wave in the case of string oscillation equation, and the case of telegraph equation is reduced to Volterra type integral equations. The proof of uniqueness theorems are basicly based on the theory of characteristics.