

The Difference Potential Method and its applications.

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The Difference Potential Method (DPM) is a novel numerical method possessing many unique properties. In particular, it allows reducing the solution of a boundary-value problem in an arbitrary domain to the solution of a boundary equation without the knowledge of Green's function. The main ingredient of the method, the difference potential, plays the role similar to that of the Cauchy-type integral in the theory of analytic functions.

The lecture is devoted to ideas, constructions, and new general opportunities that the DPM provides in discrete modelling and for solving different problems of mathematical physics.

The new possibilities of DPM are illustrated by the applications to numerical solution of the Stokes problem for viscous fluid flow, and to construction of non-local artificial boundary conditions for calculating of gas flow around an airfoil and non-reflecting artificial boundary conditions for the long-time calculating of wave propagation. We shall present the analytical potential-based model of the active sound control. A special attention will also be paid to coupled problems (e.g., fluid-structure interaction) and decomposition method.