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Control approach in cloaking problems for Helmholtz and Maxwell equations

In this paper control problems for Helmholtz and Maxwell equations associated with acoustic and electromagnetic cloaking are considered.

The paper consists of two parts. In the first part the control problems are considered for the 2-D Helmholtz equation describing scattering TH(or TE) polarized electromagnetic waves in unbounded homogeneous medium containing a permeable dielectric obstacle with partially coated (for masking) boundary. These problems arise when creating methods of cloaking material bodies. The role of control in control problem under study is played by boundary impedance or boundary conductivity on the coated part of the boundary. Solvability of control problems is proved, the optimality system which describes the necessary conditions of extremum is derived. Based on its analysis the uniqueness and stability of optimal solutions are established.

In the second part these results are generalized to the case of 3-D Maxwell equations considered under impedance boundary conditions on the coated part of the boundary.

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