Rumyantseva, Olga D.; Shurup, Andrey S.; Zotov, Dmitriy I.
Possibilities for separation of scalar and vector characteristics of acoustic scatterer in tomographic polychromatic regime. (English) J. Inverse Ill-Posed Probl. 29, No. 3, 407-420 (2021)

Summary: The inverse wave problem of tomographic type is considered. It consists in reconstruction of several scatterer’s characteristics in the form of spatial distributions for sound speed, medium density, absorption coefficient and power index of its frequency dependence, as well as vector of flow velocity. In the form of a survey material (based on several publications), a sequence of steps is discussed that leads to reconstruction of each individual spatial distribution in the presence of different combinations of the mentioned characteristics. The minimum number of frequencies required for reconstruction is discussed when the complete set of scattering data is available at each of the frequencies. For the first time, two possible approaches to reconstruct the scatterer characteristics in the presence of inhomogeneous spatial distributions of the density and the flow velocity vector are compared, and attention is drawn to the perspectives of reconstruction by functional algorithms in this case. The possibility of separating the sought spatial distributions during the inverse problem solution is illustrated by numerical modeling.

MSC:
35R30 Inverse problems for PDEs
65N21 Numerical methods for inverse problems for boundary value problems involving PDEs

Keywords:
acoustic tomography; sound speed; power index for frequency dependence of absorption coefficient; functional methods for inverse problem solution

Full Text: DOI

References:


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