REGULARIZATION IN BANACH SPACES FOR INVERSE SCATTERING MEDICAL IMAGING

C. Estatico
Department of Mathematics, University of Genoa
Via Dodecaneso 35, I-16146 Genova, Italy
estatico@dima.unige.it

In electromagnetic inverse scattering, the characterization of an (unknown) scattering object inside an investigation domain is based on retrieving the equivalent source from the scattered field outside the source region, due to the illumination by a known electromagnetic incident field. Inverse scattering imaging is very useful in biomedical applications where the dielectric properties of human tissues have to be restored by means of minimally-invasive techniques. The mathematical model of this inverse problem leads to the solution of an ill-posed, nonlinear and implicit 3D integral equation.

After a brief introduction about regularization theory in Banach spaces, in this talk we discuss a conjugate-gradient-based iterative regularization algorithm developed in L^p spaces, with $1 < p < +\infty$, for solving the inverse scattering problem which involves large-scale structured matrices. The proposed method can be useful for continuous monitoring of hemorrhagic brain strokes via microwaves. We will show numerical simulations with anatomically-realistic phantoms, as well as some preliminary experimental results.

References

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