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Microwave inverse scattering medical imaging via iterative regularization in Banach spaces

Diagnostic capabilities of microwave imaging can be 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 of the recent regularization theory in Banach spaces, in this talk we discuss a conjugate-gradient-based iterative regularization algorithm developed in L^p spaces, with $1 < p < +\infty$, in conjunction with an inexact-Newton solving scheme. The proposed method is applied to obtain the reconstruction of hemorrhagic brain strokes. We will show numerical simulations with two- and three-dimensional anatomically-realistic phantoms, as well as some preliminary experimental results.