“Approximate Global Convergence for Coefficient Inverse Problems”

Abstract:
In the last five years a new approach to numerical methods for some Multidimensional Coefficient Inverse Problems (MCIPs) was developed. The case of single measurement data is considered. Conventional numerical methods for these MCIPs are locally convergent ones. Because of substantial difficulties in the goal of construction of reliable numerical methods for MCIPs, we use an approximate mathematical model. The approximation amounts to the truncation of a certain asymptotic series and it is used on the first iteration only. The main point is that it is possible to prove that, within this approximate model, the method provides points in a small neighborhood of the solution without any advanced knowledge of this neighborhood. We call this property “approximate global convergence”. That approximation should be verified of course. This is done on many numerical experiments with computationally simulated data. Furthermore, two different types of blind experimental data were considered. Numerical results have revealed a very good accuracy of that method for these real data.