Meeting: 1003, Atlanta, Georgia, SS 4A, AMS-SIAM Special Session on Theoretical and Computational Aspects of Inverse Problems, I

1003-35-1022 **Rainer Kress** and **William Rundell*** (rundell@math.tamu.edu), Dept of Mathematics, Texas A&M University, College Station, TX 77843-3368. *Iterative solution of inverse boundary value problems using probing functions.* Preliminary report.

As a model case for a method that we believe will have wide applicability, we consider the inverse problem of determining the shape of a perfectly conducting inclusion D within a two dimensional medium Ω. The (closed, Jordan) boundary curves we denote by ∂D and $\partial\Omega$. We assume that $\triangle u = 0$ in Ω/D, $u = f$ on $\partial\Omega$ and $u = 0$ on ∂D. The problem is to recover ∂D from the additional measurement of $g := \partial u/\partial\nu$ on the outer boundary $\partial\Omega$. We use a series of test functions $\Phi(x, y)$ and the data $\{f, g\}$ to set up a pair of nonlinear operator equations. We show local solvability and discuss various reconstruction considerations. Extension of the idea to similar inclusion problems will be indicated. (Received October 02, 2004)