

Yaroslav V. Kurylev, Matti Lassas, Erkki Somersalo: *Maxwell's Equations with Scalar Impedance: Direct and Inverse Problems*; Helsinki University of Technology Institute of Mathematics Research Reports A455 (2003).

Abstract: *The article deals with electrodynamics in the presence of anisotropic materials having scalar wave impedance. Maxwell's equations written for differential forms over a 3-manifold are analysed. The system is extended to a Dirac type first order elliptic system on the Grassmannian bundle over the manifold. The second part of the article deals with the dynamical inverse boundary value problem of determining the electromagnetic material parameters from boundary measurements. By using the boundary control method, it is proved that the dynamical boundary data determines the electromagnetic travel time metric as well as the scalar wave impedance on the manifold. This invariant result leads also to a complete characterization of the non-uniqueness of the corresponding inverse problem in bounded domains of \mathbb{R}^3 .*

AMS subject classifications: 35A21, 35J55, 35L50, 35Q60, 35R30, 53C21, 58A10, 58J32, 58J90, 78A25

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