Title: "Analysis of Four-Point Alternating Current Potential Drop Measurements on an Anisotropic Conductive Half Space"

Abstract:

"In this thesis, an analysis is carried out concerning the behavior of the electric field when a line current is extracted/injected perpendicularly into a uniaxially anisotropic half-space. Such a solution enables characterization of uniaxially anisotropic materials using alternating current methods. This problem has previously been solved for the case of an isotropic half space. This paper follows a parallel development to that presented by Bowler [J. Appl. Phys., 96, 4607-4613, 2004] in which a transverse magnetic potential formulation was employed to derive an analytic solution for the electric field and alternating current potential drop measured by a four-point probe in contact with an isotropic half-space conductor. Here, the case when conductivity is given by a diagonal matrix quantity is treated. This is done by first solving for the electric field in the case of a single wire, and then using superposition to obtain the electric field on the conductor surface with two wires representing the current injection/extraction seen in a four-point probe. Finally, an analytical expression for the potential drop measured between the pick-up pins of the probe is given."