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Iterative Solution of Field Problems with a Varying Physical Parameter

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**Abstract:** In this paper, linear field problems with a varying physical parameter are solved with the conjugate-gradient FFT method and a dedicated extrapolation procedure for generating the initial estimate. The scheme is formulated and illustrated for two simple example problems. The importance of the choice of the stop criterion and the step size are demonstrated for the case of a straight thin-wire segment. A brief summary is given of the applications that have appeared in the open literature until now, and actual three-dimensional scattering problems for a rectangular conducting plate and an inhomogeneous, dispersive dielectric body are discussed. Finally, the case where the medium surrounding the object of interest is no longer homogeneous is addressed for two representative examples: wire antennas over a layered half space and an inhomogeneous dielectric cylinder in a water-filled container.

**Key Words:** Field computations, iterative techniques, initial estimate, wire and patch antennas, dielectric object, embedding.

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