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The reconstruction of a time-dependent source from a surface measurement for full Maxwell's equations by means of the potential field method

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Abstract

This paper is devoted to the study of an inverse source problem governed by full Maxwell's equations by means of the potential field method (the $A\text{-}\phi$ method). The source term is assumed to be separable in time and space, in which the unknown part is solely time-dependent and is recovered from a surface measurement. We prove that the solution to the inverse problem based on the $A\text{-}\phi$ formulation is existing and unique. We suggest a constructive scheme for approximating the solution and discuss its convergence. Finally, a few examples are presented to verify the theoretical results.

Key words: Maxwell's equations, inverse source problem, $A\text{-}\phi$ method, reconstruction, time discretization

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