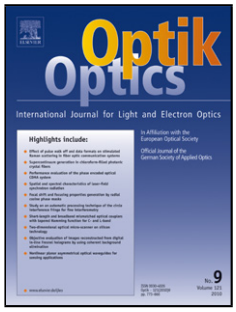

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Fractional dual fields to the Maxwell equations for a line source buried in dielectric half space

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Abstract

Fractional dual solutions to the Maxwell equations for a line source carrying time harmonic current and buried in planar dielectric half space geometry have been derived. Fractional dual solutions may be regarded as intermediate step between the two given canonical cases which are connected through the principle of duality. Original case is an electric line source buried in dielectric half space and dual to the original case is a magnetic line source buried in dielectric half space. For fractional dual situations, impedance of the interface separating the two half spaces has also been determined.

1. Introduction

Two decades before, Prof. Engheta from University of Pennsylvania, USA, initiated work on finding the roles and applications of tools of fractional calculus, a branch of mathematics, in the subject area of electromagnetics [1-6]. Classically, the subject fractional calculus contains fractional order derivative and fractional order integral as the only two tools with variety of definitions given in scientific literature [7-8]. The order of two fractional operators can be real/complex. Engheta utilized the tools of fractional calculus in a number of research problems and the results revealed that tools of fractional calculus can be useful in describing certain phenomenon/behaviors