Dear Prof. Uzunoglu,
we are student of Prof. N.G. Alexopoulos, who forwarded us your message about the NATO-ASI conference. We would like to participate to the conference, and deliver a presentation by the title "The Diaz-Fitzgerald Time Domain Model for the solution of electromagnetic problems". Our presentation will take approximately 20 minutes. Follows the Abstract of the presentation. Please let us know if you also need a hard-copy of the same.

Thank you in advance
Best regards

Franco De Flaviis
Massimo G. Noro

Abstract

Electromagnetic phenomena can be simulated by the dynamics of a mechanical system as long as the Hamiltonian of the electromagnetic and the mechanical systems coincide. In this paper we present a generalization of G.F.FitzGerald's pulleys and rubber-bands mechanical model for the interaction of electromagnetic waves with complex media.

We show a direct analogy between the FitzGerald model and the electric vector potential formulation, at each stage of the extension of the original model: each mechanical observable has a unique correspondence in the vector potential formulation. This strict analogy allows further inductive developments of the mechanical model and extends the pedagogical importance of the original Fitzgerald model. As a consequence very complex materials for the electromagnetic point of view such as simultaneous electric and magnetic frequency dependent materials are easily understood and implemented with simple modifications in the mechanical system.

Several engineering applications are described: classical scattering problems from dielectric, magnetically permeable, dielectrically lossy and Debye materials. The simulations are validated with comparison to canonical solutions.