

Direct integration of the Constitutive Relations for modeling Metamaterials with the Finite Difference Time Domain Technique

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A new procedure of integration of the Maxwell equations is present to study dielectric and magnetic dispersive materials using the Finite Difference Time Domain Method. Our method is based on the direct application of the Fourier Transform for the temporal and frequency integrations of the constitutive relations. We perform several numerical experiments for Drude and Lorentz dispersive media. We also present the generalization for any form of the permittivity and permeability using numerical integrations of the constitutive relations. Our method allows simulating the light propagation on any kind of material parameters and is formulate to be useful to treat numerical data obtained from the new Homogenization Theories of Metamaterials.