The long term research goal is to develop a rigorous analytic formulation and, based upon this, a uniform asymptotic description of pulsed electromagnetic beam-field propagation, reflection, and transmission phenomena in causally dispersive dielectric and conducting media. Emphasis has been placed first on a formulation that is rigorously derived from the macroscopic Maxwell's equations with constitutive relations that are appropriate for a homogeneous, isotropic, nonhysteretic, locally linear, temporally dispersive medium, followed by the development and application of the required uniform asymptotic expansion techniques necessary to yield a completely continuous description of the space-time evolution of the pulsed beam-field at large propagation distances from the input plane.
(due May 1993)

The Asymptotic Theory of the Reflection and Transmission of a Pulsed Electromagnetic Beam Field at a Planar Interface Separating Two Dispersive Media

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Our long-term research goal is to develop a rigorous analytic formulation and, based upon this, a uniform asymptotic description of pulsed electromagnetic beam-field propagation, reflection, and transmission phenomena in causally dispersive dielectric and conducting media. Emphasis has been placed first on a formulation that is rigorously derived from the macroscopic Maxwell's equations with constitutive relations that are appropriate for a homogeneous, isotropic, nonhysteretic, locally linear, temporally dispersive medium, followed by the development and application of the required uniform asymptotic expansion techniques necessary to yield a completely continuous description of the space-time evolution of the pulsed beam-field at large propagation distances from the input plane. A detailed description of the most recent results of this research was recently presented in a talk entitled “Asymptotic Description of Electromagnetic Pulse Propagation in a Linear Dispersive Meeting.” by the Principal Investigator at the International Conference on Ultra-Wideband, Short Pulse Electromagnetics at the Weber Research Institute (October 1992). A portion of this research resulted in the following publications (reprints attached if currently available):


No patents have resulted from this research.