1046-78-852 **Natalie A. Cartwright*** (cartwrin@newpaltz.edu), Department of Mathematics, SUNY New Paltz, New Paltz, NY 12561, and **Kurt E. Oughstun** (oughstun@cems.uvm.edu). *Pulse Propagation in a Debye Material with Static Conductivity: The Search for a Uniform Expansion.* Preliminary report.

We study the propagation of an ultrawideband electromagnetic pulse through a semiconductor with complex dielectric permittivity given by a Debye model with static conductivity σ, as

$$\epsilon_c(\omega) = \epsilon_\infty + \frac{\Delta\epsilon}{1 - i\omega\tau} + i\frac{\sigma}{\omega}.$$

Our method of analysis is an asymptotic approximation to the integral representation of the electric field component of the propagated field

$$E(z,t) = \frac{1}{2\pi}\int_{ia-\infty}^{ia+\infty} \tilde{E}(0,\omega)\exp\left[\frac{z}{c}\phi(\omega,\theta)\right]d\omega,$$

where $z > 0$ is the propagation distance into the material. Here, $a > 0$ is a constant, $\tilde{E}(0,\omega)$ is the temporal spectrum of the pulse in the plane $z = 0$, $\phi(\omega,\theta) = i\omega\left[\epsilon_c^{1/2}(\omega) - \theta\right]$ is the complex phase function, $\theta = ct/z$ is a space-time parameter and c denotes the speed of light in vacuum.

We have found non-uniform asymptotic expansions that provide a valid approximation to the propagated field for low and high levels of static conductivity. In this talk, we will address the issues faced in finding a uniform description that is valid for all levels of static conductivity. (Received September 12, 2008)