1077-35-2813 **Michael I Weinstein*** (miw2103@columbia.edu), 212 SW Mudd Building, Columbia University, New York, NY 10027. *Carrier Shocks and Coherent Structures in the Nonlinear Maxwell Equation.*

We consider the 1-dimensional propagation of E&M waves in a weakly nonlinear and low-contrast spatially periodic medium with no energy dissipation, in which dispersion enters only through the spectral band dispersion associated with the periodic structure. Numerical simulations show that for wave-packet data, very long-lived spatially localized coherent soliton-like structures emerge, whose character is that of a slowly varying envelope of a train of shocks. This violates the oft-assumed nearly monochromatic wave packet structure governed by the nonlinear coupled mode eqns (NLCME). We systematically derive a fully consistent set of nonlocal integro-differential equations governing the coupled evolution of backward and forward propagating waves. These equations incorporate all infinitely many resonances and may be expressed as a system of infinitely many coupled mode equations, which we call the extended nonlinear coupled mode eqns (xNLCME).

Numerical simulations of xNLCME capture both large scale features and the fine scale carrier shocks of the nonlinear periodic Maxwell equations. Finally, we explore the existence of spatially localized states corresponding to broad band solitons of xNLCME. This is joint work with G. Simpson and D. Pelinovsky. (Received September 22, 2011)