Atelier
« Modèles et méthodes mathématiques en filamentation laser »
10-14 mars 2014

Workshop
"Mathematical Methods and Models in Laser Filamentation"
March 10–14, 2014

Broad band solitons in a periodic and nonlinear Maxwell system

Dmitri Pelinovsky *

dmpeli@math.mcmaster.ca

WEB: http://dmpeli.math.mcmaster.ca

We consider the one-dimensional Maxwell equations with low contrast periodic linear refractive index and weak Kerr nonlinearity. Wave packet initial conditions with a single carrier frequency excite infinitely many resonances. On large but finite time-scales, the coupled evolution of backward and forward waves is governed by nonlocal equations of resonant nonlinear geometrical optics. For the special class of solutions which are periodic in the fast phase, these equations are equivalent to an infinite system of nonlinear coupled mode equations. Numerical studies support the existence of long-lived spatially localized coherent structures, consisting of a slowly varying envelope of a train of carrier shocks. Thus, it is natural to study the localized coherent structures of the infinite system of nonlinear coupled mode equations.

*Department of Mathematics, McMaster University, 1280 Main Street West, Hamilton, ON L8S 4K1, CANADA.