Solitary-Wave Interaction in the Short-Pulse Equation

Jose Barrios and A. David Trubatch*

* Department of Mathematical Sciences
Montclair State University
Montclair, NJ 07043 U.S.A
email: david.trubatch@montclair.edu

Abstract:

The short-pulse equation (SPE) describes the propagation of light pulses of ultra-short duration in nonlinear optical media. Breather soliton solutions of SPE have been constructed previously by a transformation from the Sine-Gordon equation [1]. We describe the results of simulations of the collision of pairs of these solitons. The soliton interaction is observed to vary qualitatively as a function of a parameter which measures the "shortness" of the pulse envelope relative to the internal oscillations. These changes are intermittent as the parameter varies. Moreover, for some parameter values, soliton interaction generates persistent, highly oscillatory coherent states.

References:
   1. A. Sakovich and S. Sakovich, J. Phys. A: Math. Gen. 39 (2006) L361-L367