

# Fractal Structure in Solitary Wave Collisions of Coupled Nonlinear Schroedinger Equations

Jianke Yang  
Department of Mathematics and Statistics  
University of Vermont  
Burlington, VT 05401, USA

We study the collision of two solitary waves in the non-integrable coupled nonlinear Schroedinger equations. We show that the separation velocity versus collision velocity graph has a fractal structure. When we zoom into this graph, we get a structure qualitatively identical to the original one. In addition, collision dynamics in the zoomed-in windows is intimately related to that in the original graph. We explain this fractal dependence of the collision by a resonance mechanism between the translational motion of solitary waves and internal oscillations inside a solitary wave.