

Fractal Dynamics in Quintic NLS Soliton Collisions: A Review

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In this work we explored the multi bouncing and fractal phenomena observed in the velocity-phase relationship during soliton collisions in the quintic nonlinear Schrödinger equation. We studied and used a classical finite difference scheme adapted for simulating these collisions, followed by the derivation and simulation of the governing system of ODEs for soliton trajectories and velocities. Additionally, we discussed potential invariants that may help clarify the origins of the fractal patterns, both within the original PDE and the reduced ODE system.