

## APPLIED DYNAMICAL SYSTEMS SEMINAR

### Fractal Structures in Solitary Wave Interactions

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Korman 245

The following scenario has been seen in many nonintegrable, dispersive, nonlinear PDE over the last 25 years: two solitary waves are propagated on a collision course. Above some critical velocity, they simply bounce off each other. Below they they may be captured and merge into a single localized mass, or they may interact a finite number of times before escaping each other's embrace. Whether they are captured, and how many times the solitary waves interact before escape, depends on the initial velocity in a complicated, likely fractal, manner.

These PDE systems are commonly studied by deriving a reduced set of ODE that numerically reproduce this behavior. Using matched asymptotics and Melnikov integrals, we give asymptotic formulas for the critical velocity and for certain salient features of the fractal structure. We derive an iterated map through which the entire structure can be unravelled. Recent results focus on how radiation- induced dissipation effects the fractal structure.