



Lehrstuhl für Analysis und Modellierung

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Nanopteron Traveling Waves in Fermi-Pasta-Ulam-Tsingou Lattices

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Abstract: A Fermi-Pasta-Ulam-Tsingou (FPUT) lattice is an infinite chain of particles coupled by nonlinear springs and constrained to move horizontally. The existence of solitary traveling waves in a monatomic FPUT lattice, in which all the particles have the same mass and all the springs exert the same force, is well-known. However, when we allow the masses or spring forces to alternate, in which case the lattice is called a mass or spring dimer, the traveling waves can perturb into nanopterons. The profiles of these waves are the superposition of a small-amplitude, high frequency periodic piece and an exponentially localized term. I will discuss the existence and properties of nanopterons in the “long wave” limit, in which the exponentially localized “core” of the nanopteron is a KdV soliton, as well as ongoing investigations into nanopterons under the “equal mass” limit, in which a monatomic FPUT lattice is perturbed into a mass dimer whose masses are almost equal. This is joint work with Doug Wright (Drexel University, Philadelphia, PA, USA) and Hermen Jan Hupkes (Leiden University, The Netherlands).