

Breather solutions to quasilinear wave equations

Sebastian Ohrem, KIT

Abstract

We consider the quasilinear wave equation

$$V(x)u_{tt} - u_{xx} + \Gamma(x)(u_t^3)_t = 0 \quad \text{on} \quad \mathbb{R} \times \mathbb{R}$$

which arises in the study of localized electromagnetic waves modeled by Maxwell equations with Kerr-type optical materials. We are interested in time-periodic, spatially localized solutions, called *breathers*.

For a compactly supported nonlinear potential Γ and several choices of the linear potential V , we prove existence of breathers using variational methods, and discuss their regularity.

We also consider quasilinear wave equations corresponding to materials of cylindrical geometry or materials with temporally delayed nonlinear response.