Radial sine-Gordon kinks as sources of fast breathers - DTU Orbit (21/01/2019)

Radial sine-Gordon kinks as sources of fast breathers

We consider radial sine-Gordon kinks in two, three, and higher dimensions. A full two-dimensional simulation showing that azimuthal perturbations remain small allows us to reduce the problem to the one-dimensional radial sine-Gordon equation. We solve this equation on an interval \([r, r_1]\) and absorb all outgoing radiation. As the kink shrinks toward \(r\), before the collision, its motion is well described by a simple law derived from the conservation of energy. In two dimensions for \(r \leq 2\), the collision disintegrates the kink into a fast breather, while for \(r \geq 4\) we obtain a kink-breather metastable state where breathers are shed at each kink "return." In three and higher dimensions \(d\), an additional kink-oscillon state appears for small \(r\). On the application side, the kink disintegration opens the way for new types of terahertz microwave generators.

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