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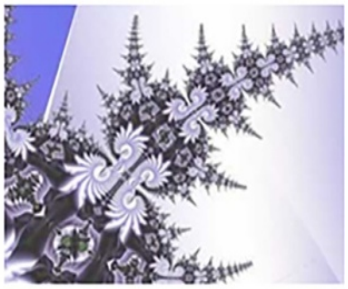

Abstract submitted

Breathers in an all flatband lattice with hard on-site potential.

Juan FR Archilla[1], Sergej Flach[2]
[1]Universidad de Sevilla, Spain
[2]Institute for Basic Science, Daejeon, Republic of Korea

A modified system based on a linear electrical circuit with all flat bands is presented. The system consists of a one-dimensional diamond lattice with three oscillators per unit cell. Each oscillator corresponds to an LC circuit coupled to the ground and they are distributed into three rows of different oscillator type. The oscillators in the central row, labelled T_n are coupled to the oscillators in the other two rows above and below, labelled U_n and V_n, respectively, and to the same types at the previous unit cell, i.e., U_{n-1} and V_{n-1}, with *T*-*V* and *T*-*U* having different coupling.

The modification is the addition of an on-site quadratic term to the original harmonic one. This modification allows for the existence of breathers with frequency at the gaps between the three optical phonon bands, which remain all flat.

There are nine different types of the breathers, each one characterized by having the largest amplitude at different oscillator type: (i) *T* , (ii) *U*, or (iii) *V*, and oscillating with frequencies at three different bandgaps: (a) above the highest frequency flatband; (b) between the highest and the middle one, and; (c) between the middle and the lowest one. No breathers can be constructed below the lowest flatband.

The profiles of each breather are different for the T_n, U_n, V_n oscillator types, with a core of one to three oscillators, and being almost zero outside the core. They are quasi-compact with a very fast exponential diminution of the oscillators' amplitude of 15 orders of magnitude at each oscillator.

The breathers above the upper and medium phonon bands are stable and the other one is unstable, for frequencies close the lower ibandgap border. We study their range of existence and stability in terms of their frequency and their different lifetimes as a function of the different types of breather.

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