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A nonlinear coupled cantilever array with time-periodic on-site potentials and Floquet breathers

Content

Intrinsic localized modes (ILMs) or discrete breathers (DBs) have been observed experimentally in a coupled cantilever array with nonlinear on-site potentials [1,2]. The on-site potential is introduced via the magnetic interaction between a permanent magnet, which is attached to the free end of the cantilever, and an electromagnet. Since the strength of the interaction can be modulated by the current flowing in the electromagnet, it is rather easy to realize a time-dependent on-site potential. Indeed, an ILM was successfully manipulated by locally changing the current of the electromagnet.

In this talk, we briefly introduce the experimental system and the equation of motion. Afterward, DB solutions are obtained for which the on-site potentials are modulated periodically in time. The stability and bifurcations of the DB solutions, namely Floquet breathers [3], will be discussed.

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References:

[1] M. Kimura, T. Hikihara, "Coupled Cantilever Array with Tunable On-site Nonlinearity and Observation of Localized Oscillations,"*Phys. Lett. A* **373**, 1257-1260 (2009).
[2] M. Kimura, T. Hikihara, "Experimental Manipulation of Intrinsic Localized Modes in Macro-Mechanical System,"*Nonlinear Theory and Its Applications, IEICE* **3(2)**, 233-245 (2012).
[3] M. Kimura, Juan F.R. Archilla, Y. Doi, V.S. Sánchez-Morcillo, "Floquet breathers in a modulated nonlinear lattice,"*Chaos* **36**, 033151 (2026).

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