



PIMS / AMI Seminar

Wednesday, Sept 5, 2012

3:00 p.m.

CAB 657



“Intrinsic Localized Modes in Mechanical Cantilever Array”

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Abstract

In 1988, intrinsic localized mode (ILM) was theoretically discovered as a temporary periodic and spatially localized solution in a nonlinear coupled oscillator. This discovery triggered wide-spread investigations on energy localization phenomena in spatially discrete systems. In particular, observations of the ILM in micro-mechanical cantilever arrays enable us to expect that energy localization phenomena can be utilized for micro-/nano-engineering. However, the dynamical behavior and control of ILM is still an open problem. Therefore, we study the possibility of control of ILM in coupled cantilever arrays.

In this talk, at first, basic properties of ILM such as stability are briefly introduced. The stability of ILM is determined by the spatial symmetry. We show that the stability is strongly affected by the ratio in nonlinearities of on-site and inter-site potentials of the coupled cantilever array. Then, behavior of traveling ILM is investigated by computing invariant manifolds of unstable ILM. Based on the result of the investigation, we propose a new concept of manipulation called "capture and release" manipulation. In the final part of this talk, some experimental results are shown. We fabricated a macro-mechanical cantilever array with magnetic potentials to confirm numerical results on the dynamics of ILM. Several ILMs were observed, and successfully manipulated by adding an impurity. In addition, a result in another cantilever array, which is fabricated recently, is shown briefly.

Refreshments will be served in CAB 649 at 3:00 p.m.

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