INSTITUT NATIONAL DES SCIENCES APPLIQUÉES CENTRE VAL DE LOIRE

Avis de conférence

Toy Models for Nonlinear Acoustics

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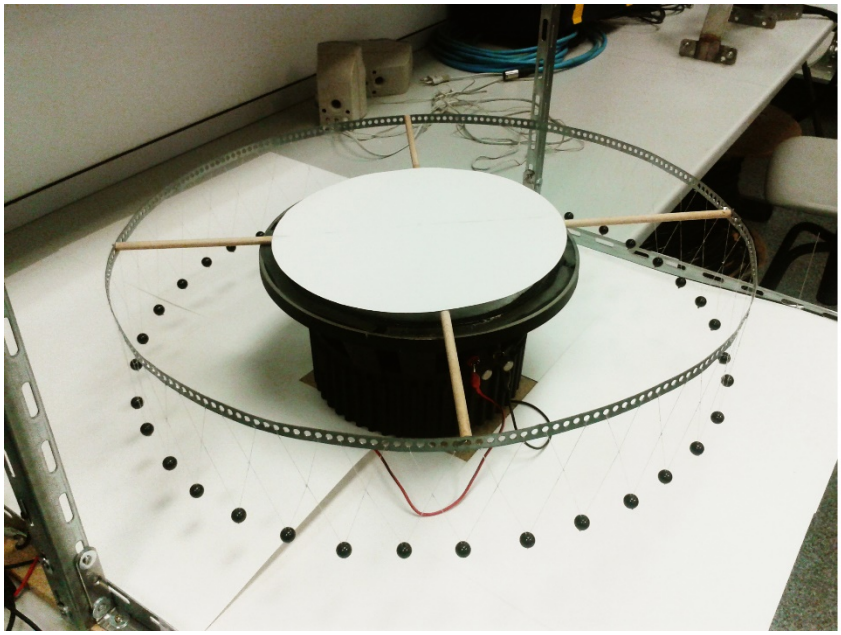
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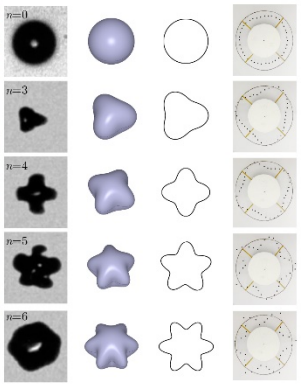
Mardi 5 février 2016, 13h

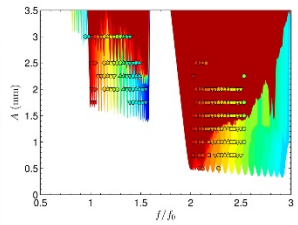
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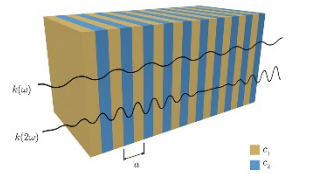
Abstract:

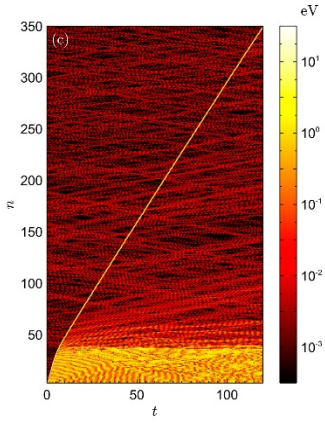
Some of the simplest dynamical systems in nature hide complex behavior. Among them, the most celebrated is the pendulum. When a collection of these nonlinear oscillators are coupled forming an array, the full system exhibits complex dynamics: damping and dispersion of waves, together with nonlinearity governs its spatio-temporal behavior. On the other hand, these basic features are also inherent of most complex acoustical systems. Therefore, it is not a surprise that its behavior can be captured by the rich and complex dynamics of coupled oscillator arrays. The use of reduced systems is suitable to obtain analytic solutions of the full governing equations, but also experiments can be designed. These "toy models" are extremely useful when expensive and complex experiments and/or simulations are required for the analysis of the complete system. This is the case of microbubbles under the action of ultrasound, either in the form of free gas bubbles surrounded by a fluid or encapsulated bubbles, that are commonly used as contrast agents for medical echography. In this case, the behavior of a microbubble along its equator can be linked to a system of parametrically-excited a ring-shaped chain of coupled pendula. Other example are nonlinear-periodic media, where we show that a "toy model" made of a chain of magnetically coupled pendula can be used for modelling localized nonlinear travelling waves in cation lattices and also in nonlinear acoustic media with layers of alternating properties.

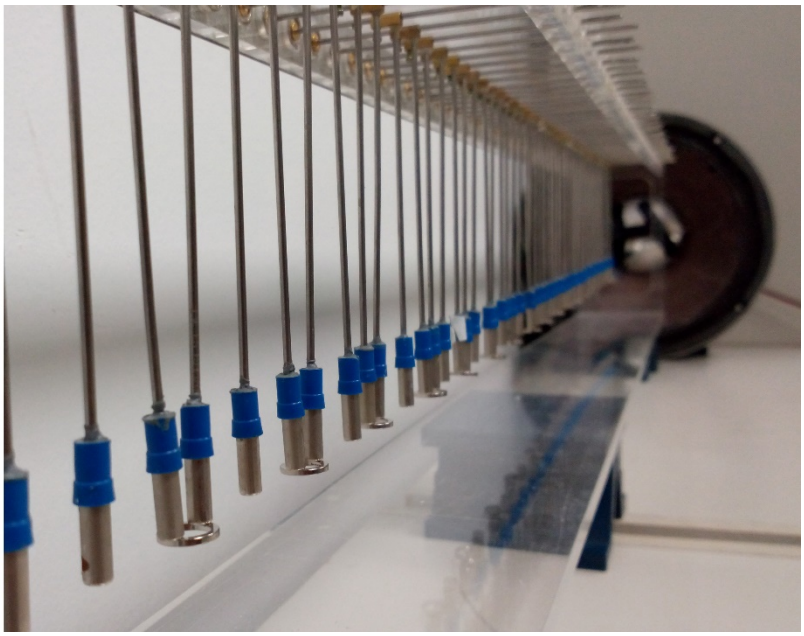












Conférence de vulgarisation scientifique, notamment ouverte aux étudiants, enseignants et chercheurs.

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