2007 ICU Vienna

The International Congress on Ultrasonics is a merger of the successful conference series **WCU World Congress on Ultrasonics** and **UI Ultrasonics International** according to the short formula:

ICU = WCU + UI

The Big Bang in Ultrasound will take place at the **Vienna University of Technology from April 9 - 12, 2007.**

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Presentation

Type: Invited Paper
Recommended topics
  R19 Nonlinear acoustic phenomena
Special session: S02 Nonlinear acoustics of granular media

Abstract

Title
Nonlinear waves in hertzian granular chains: effects of inertial and stiffness heterogeneities

Abstract
It has been established for long that a one-dimensional monodisperse dry granular medium (a chain of identical beads which interact via the nonlinear Hertz potential) exhibits strongly nonlinear behaviors [1,2]. When such a medium is under static compression, a shock applied at one extremity may propagate as dispersive linear acoustic waves at low amplitudes, and as strongly nonlinear waves with compact support (solitary waves) at higher amplitudes. Interestingly, when the medium is uncompressed, acoustic waves disappear and the dynamics is only controlled by fully nonlinear effects. When the medium further contains some heterogeneities (e.g. local modification of the rigidity or of the inertia), it exhibits even more complex behaviors. We have previously shown experimentally, analytically, and numerically some phenomena such as nonlinear wave reflection on a massive and rigid boundary [3] and pulse mitigation in tapered chains of beads [4]. I will present, in this talk, recent results concerning nonlinear waves localization in a monodisperse chain containing an intruder of smaller size [5] and stiffness modification in a wet granular medium, when additional fluid is set between grains [5].

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[3] S. Job, F. Melo, A. Sokolow, S. Sen, Phys. Rev. Lett., 94, 178002 (2005).
[4] F. Melo, S. Job, F. Santibanez, F. Tapia, Phys. Rev. E, 73, 041305 (2006).
[5] S. Job, F. Melo et al (to be submitted).

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