ICTCA 2017 VIENNA

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Book of Abstracts

30. Juli - 03. August 2017



Acoustic and Elastic Metamaterials

GM1 Audimax, Building BA Chaired by B. Popa

15:00 *Soda Cans Metamaterial: A Subwavelength-Scaled Phononic Crystal* (invited)
Fabrice Lemoult, Simon Yves, Nadège Kaina, Mathias Fink, Geoffroy Lerosey

15:30 *Anti-tetrachiral Lattices as Acoustic Metamaterials*
Theodore P. Martin, Kristin Charipar, Matthew D. Guild, Charles A. Rohde, Alberto Pique, Gregory J. Orris

15:50 *Nonlinear Waves in a Lattice of Magnetic Dipoles*
L. Salmerón-Contreras, N. Jiménez, **V. J. Sánchez-Morcillo**, L. M. Garcia-Raffi, R. Picó, J. F. R. Archilla

16:10 *Design and characterization of ultrasonic lenses based on generalized Cantor sets*
Sergio Castiñeira-Ibáñez, Pilar Candelas, Jose Miguel Fuster, Daniel Tarrazó-Serrano, **Constanza Rubio**

16:30 *Nonlinear Waves in Layered Ionic Crystals*
Juan F. R. Archilla, Yuriy A. Kosevich, Yaroslav O. Zolotaryuk, Víctor Sánchez-Morcillo, Noé Jiménez, Luis M. García-Raffi

Seismic Attenuation and Seismic Data Processing

Lecture Hall **GM2** Radinger, Building BD Chaired by J. Gao and H. Li

15:00 *Q Estimation from the Envelope Peak Instantaneous Frequency based on Generalized Seismic Wavelet*
Guowei Zhang, Jinghuai Gao

15:20 *Anti-aliasing in Kirchhoff beam migration*
Bangyu Wu, Hui Yang, Jinghuai Gao

15:40 *Seismic Instantaneous Attributes Extraction and Applications to Reservoir Characterization*
Naihao Liu, Jinghuai Gao, Bo Zhang, Xiudi Jiang, **Qian Wang**

16:00 *A robust and precise seismic dip estimation method based on instantaneous phase*
Xiaokai Wang, Wenchao Chen, Jinghuai Gao, **Haixia Zhao**, Changchun Yang

16:20 *The DAS coupling noise removal using alternating projection iteration with united sparse transforms*
Jianyou Chen, Wenchao Chen, Xiaokai Wang, Dawei Liu, **Bangyu Wu**

16:40 *Random noise attenuation of seismic data using variational mode decomposition and time-frequency peak filtering*
Zhen Li, Jinghuai Gao

Nonlinear Waves in a Lattice of Magnetic Dipoles

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We consider a lattice of nonlinearly coupled oscillators, where the masses interact with their nearest neighbors by repulsive forces. Such physical system is realized experimentally, with an array of cylindrical magnets (magnetic dipoles), forming a nearly one dimensional chain of masses coupled by its magnetic fields. The magnetic moments of neighbor magnets are oriented in the same directions, so they experience repulsive forces dependent on the separation between poles. Each magnet is the mass of a pendulum, which is forced to oscillate around an equilibrium position. This system may be considered as a toy model of matter at the microscopic scale, with atoms or ions interacting via coulomb potentials [1]. The chain of oscillating magnets is set at a distance from a periodic array of fixed magnets, with the same periodicity, that mimics the presence of a neighbour layer of atoms, and results in an additional substrate or onsite potential. We report a theoretical and experimental study of nonlinear waves propagating in the magnetic chain. We study in particular the existence of localized traveling perturbations, in the form of solitons or kinks, that propagate along the chain without distortion [2]. These properties of such localized perturbations are investigated for the bare chain, and also for the chain under effect of the substrate potential. Their principal characteristics, as the amplitude and velocity, are determined and compared with the theoretical modeling. Other features of nonlinear waves explored in the setup are the generation of higher harmonics, subharmonics, or the existence of an acoustic dilatation mode, corresponding to an expansion of the chain induced by the acoustic excitation.

References

[1] J.F.R. Archilla, Yu. A. Kosevich, N. Jiménez, V. J. Sánchez-Morcillo and L. M. García-Raffi, *Ultradiscrete kinks with supersonic speed in a layered crystal with realistic potentials*, Phys. Rev. E **91**, 022912 (2015)

[2] J.F.R. Archilla, N. Jiménez, V.J. Sánchez-Morcillo, L.M. García-Raffi (Eds), *Quodons in Mica: Nonlinear Localized Travelling Excitations in Crystals*, Springer Series in Materials Science, vol. 221 Springer, 2015, ISBN: 978-3-319-21044-5