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Non-linear Systems, Nanotechnology
Proceedings of the 14th International Conference on Non-Linear Analysis, Non-Linear Systems and Chaos (NOLASC '15)
Proceedings of the 6th International Conference on Nanotechnology (NANOTECHNOLOGY '15)
Rome, Italy, November 7-9, 2015
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Recent Advances in Electrical Engineering Series | 55

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Preface

This year the 14th International Conference on Non-Linear Analysis, Non-Linear Systems and Chaos (NOLASC '15) and the 6th International Conference on Nanotechnology (NANOTECHNOLOGY '15) were held in Rome, Italy, November 7-9, 2015. The conferences provided a platform to discuss nanomaterials, nanoparticles and colloids, nanomedicine, molecular self-assembly, nanoelectronics, molecular nanotechnology, non-linear systems in science, non-linear systems in engineering, chaos and chaotic behavior etc. with participants from all over the world, both from academia and from industry.

Their success is reflected in the papers received, with participants coming from several countries, allowing a real multinational multicultural exchange of experiences and ideas.

The accepted papers of these conferences are published in this Book that will be sent to international indexes. They will be also available in the E-Library of the WSEAS. Extended versions of the best papers will be promoted to many Journals for further evaluation.

Conferences such as these can only succeed as a team effort, so the Editors want to thank the International Scientific Committee and the Reviewers for their excellent work in reviewing the papers as well as their invaluable input and advice.

The Editors

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Plenary Lecture 1

Ultrasonic Nano Manipulations

Professor Junhui Hu
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Abstract: Ultrasonic nano manipulation is an emerging technology, which has great potential applications in the assembly, measurement and fabrication of nano materials, handling of biological samples, manufacturing of nano sensors, new material syntheses, etc. In recent three years, the author' research team proposed and developed a series of ultrasonic manipulating devices with the functions such as nano trapping and transfer, nano rotary driving, and nano concentration. Controlled acoustic streaming eddies are used in the nano manipulations. Compared with the nano manipulation techniques based on other physical principles, our devices have the features such as very low temperature rise at the manipulation area, little selectivity to manipulated samples, capability of implementing the manipulation on substrates given by customers. etc. In this report, we introduce the principles, structures, functions, and characteristics of the ultrasonic nano manipulating devices proposed and developed by our group, and predict the development trend of this area.

Brief Biography of the Speaker: Junhui Hu is a Chang-Jiang Distinguished Professor, China, the director of Precision Driving Lab at Nanjing University of Aeronautics and Astronautics, and the deputy director of State Key Laboratory of Mechanics and Control of Mechanical Structures, China. He received his Ph.D. Degree from Tokyo Institute of Technology, Tokyo, Japan, in 1997, and B. E. and M. E. degrees in electrical engineering from Zhejiang University, Hangzhou, China, in 1986 and 1989, respectively. He was an assistant and associate professor at Nanyang Technological University, Singapore, from 2001 to 2010. His research interest is in piezoelectric/ultrasonic actuating technology. He is the author and co-author of more than 200 papers and disclosed patents, including more than 80 full papers published in SCI journals and 1 editorial review in an international journal. He is also the sole author of monograph book "Ultrasonic Micro/Nano Manipulations" (2014, World Scientific, Singapore). Dr. Hu won the Paper Prize from the Institute of Electronics, Information and Communication Engineers (Japan) as the first author in 1998, and his research work has been highlighted by 7 international scientific media. He is a senior member of IEEE, and the editorial board member of two international journals. He was once awarded the title of valued reviewer by Sensors and Actuators A: Physical and Ultrasonics. He has given ten invited talks at international conferences, and is the honorary chairman of IWPMA 2011, held in USA.

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Plenary Lecture 2

Fractional Calculus: What Is It? And What Is It for?

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Abstract: In 1695 L'Hospital inquired to Leibniz what meaning could be given to the symbol d^n y/dx^n when n = 1/2. In a letter dated September 30, 1695 Leibniz replied "It will lead to a paradox, from which one day useful consequences will be drawn". This discussion lead to a new branch of mathematics which deals with derivatives and integrals of arbitrary order and is known as Fractional Calculus. Of course this is a misnomer kept only for historical reasons. It can be considered as a branch of mathematical analysis which deals with integro-differential operators and equations where the integrals are of convolution type and exhibit (weakly singular) kernels of power-law type. It is strictly related to the theory of pseudo-differential operators. Fractional differential and integral equations have gained considerable popularity and importance during the past three decades. The main advantage of the fractional calculus is that provides excellent instruments for the description of memory and non local properties of various materials and processes. The list of applications is huge and includes, just to cite a few, Visco-elasticity, Electrical Circuits, Control theory, intermediate phenomena between Diffusion and Wave propagation, Biology, Bioengineering, Image processing, Finance, Stochastic processes.

Brief Biography of the Speaker: Presently Francesco MAINARDI is retired professor of Mathematical Physics from the University of Bologna where has taught this course since 40 years. His fields of research concern several topics of applied mathematics, including diffusion and wave problems, asymptotic methods, integral transforms, special functions, fractional calculus and non-Gaussian stochastic processes. At present his H-index is > 40
For a full biography, list of references on author's papers and books see: Home Page: http://www.fracalmo.org/mainardi/index.htm and http://scholar.google.com/citations?user=UYxWyEEAAAAJ&hl=en&oi=ao

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Plenary Lecture 3

Further Developments in the Emulation of Non-Linear Acoustic Systems

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Abstract: It is well-known in acoustics that the emulation of the acoustics of a theatre or an auditorium could be obtained by means of convolution between dry signal and a properly-measured impulse response. However, a considerable number of audio devices (as valve amplifier or musical instruments) could definitely not be considered as linear and time-invariant systems. By using Hammerstein or Wiener series it is possible to represent the input-output relationship of nonlinear systems. These two methods could be generalised using Volterra model. It uses a set of impulse responses to describe the system and not only one as before. By an enhanced impulse response measurement method it is possible to obtain this set of impulses and then with Volterra series it would be possible to have the output of the audio system driven by any input. A special numerical tool has been developed to recreate the system behaviour by using this method. This method has been recently further developed, taking into consideration the effects of amplitude during the emulation of the device and the proper determination of the most suitable set of distortion considering the RMS value of the “dry signal” to be used for the emulation. In the lecture, the most remarkable results will be presented.

Brief Biography of the Speaker: Dr Lamberto Tronchin is Associate Professor in Environmental Physics from the University of Bologna and is recognised internationally as a leading authority on the subject of sound and acoustics. A pianist himself, with a diploma in piano from the Conservatory of Reggio Emilia, Dr Tronchin's principal area of research has been musical acoustics, room acoustics and signal processing. He is Associate Editor of the Journal of AES, and the author of more than 200 papers and was Chair of the Musical Acoustics Group of the Italian Association of Acoustics from 2000 to 2008. Dr Tronchin is a member of the Scientific Committee of the CIARM, the Inter- University Centre of Acoustics and Musical research, has chaired sessions of architectural and musical acoustics during several international symposiums, been a referee for a number of International journals and is Chair of Organising and Scientific Committees of IACMA (International Advanced Course on Musical Acoustics).
He was a visiting researcher at the University of Kobe in Japan, a visiting professor at the University of Graz in Austria and Special honored International Guest at the International Workshop, ‘Analysis, Synthesis and Perception of Music Signals', at Jadavpur University of Kolkata, India in 2005. He has chaired the International Advanced Course on Musical Acoustics (IACMA), organised with the European Association of Acoustics, which was held in Bologna, in 2005. Since 2008 he gave plenary lectures at International Congresses on Acoustics in Vancouver, Prague, Bucharest, Santander, Kos, Malta, Paris, Cambridge (UK), Salerno, Geneve. He designed theatres and other buildings, as acoustic consultant, in collaboration with several Architects, among them Richard Meier and Paolo Portoghesi.

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