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Elena Scutelnicu
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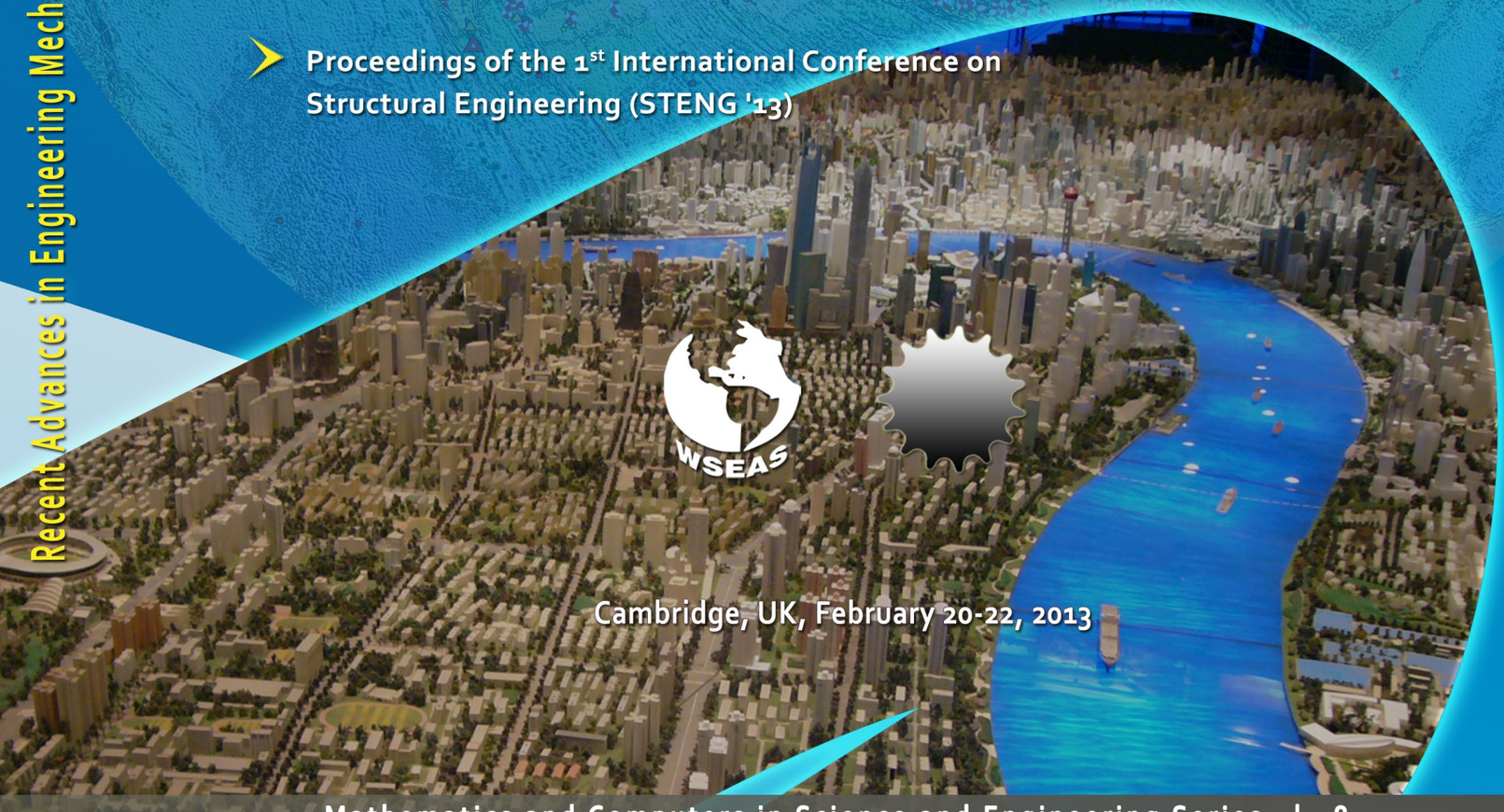
Recent Advances in Engineering Mechanics, Structures & Urban Planning

- Proceedings of the 6th International Conference on Engineering Mechanics, Structures, Engineering Geology (EMESEG '13)
- Proceedings of the 6th International Conference on Urban Planning and Transportation (UPT '13)
- Proceedings of the 1st International Conference on Structural Engineering (STENG '13)



Cambridge, UK, February 20-22, 2013

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Plenary Lecture 1

Numerical Simulation of Non-linear Dynamics of Vibration Transport Machines with Independently Rotating Vibration Exciters

Professor Sergey A. Rumyantsev
The Department of Mechanics of Solids
Ural State University of Railway Transport
Ekaterinburg, Russia
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Abstract: Vibration transport machines (VTM) are intended for transporting and/or separating variable bulk materials. Most of these machines are constructed as solid bodies (working elements, WE) fixed on springs or by means of other elastic elements that enable their plane-parallel motion.
The motion of working elements is excited by special devices called vibration exciters (VE). VE act as unbalanced rotors driven by electric motors.
Most of researchers only explored synchronous motions of VE. We had stated the problem of transient dynamic processes researching. These processes are accompanying the start of the machine from its stand still until its reaching (or not reaching) stabled synchronous motion. This approach allows evaluating the time until synchronization and the type of connections between this time and various factors.
The research was carried out using the mathematical model of dynamics of vibration transport machines with random quantity of independently rotating vibration exciters. This mathematical model is based on numerical solution of differential equations system that describes the VTM dynamics as dynamics of Vibration Transport Machine – Driven Electric Motors electromechanical system in case of asynchronous motors with random quantity of poles' pairs.
This mathematical model allows describing not only the influence of motors on non-stationary VTM dynamics, but also the influence of VTM dynamics on electromagnetic processes in the motor. It also makes it possible to calculate currents of the real three-phase motor.
The results of numerical simulation of one- and two-mass machines' dynamics in cases of two, three, and four vibration exciters mounted on the lower mass of the VTM are represented in graphic form. We were interested in creating a two-mass machine, both masses of which are oscillating insignificantly while it is not loaded with bulk materials, but after loading it comes to a resonance and its vibration amplitude increases. We have found such parameters by which the abovementioned dynamics type appears. With the using of resonance it is possible to confine with moderate vibration amplitude of the lower mass which would lead to substantial electrical energy savings at the expense of decreasing drive motors capacity.

Brief Biography of the Speaker: Sergey Rumyantsev is a professor and head of the Department of Deformable Solids Mechanics at the Ural State University of Railway Transport, Ekaterinburg, Russia. He received his MSc at Faculty of Mathematics and Mechanics at Ural State University, Ekaterinburg. He has got his PhD (Candidate of Physical and Mathematical Sciences) at the Institute of Hydrodynamics, USSR's Academy of Sciences, Novosibirsk. His Full Doctorship in Engineering Sciences he has got at the Institute for Problems in Mechanical Engineering, Russian Academy of Sciences, St. Petersburg. Presently he is teaching at the Ural State University of Railway Transport. His research activities include Computational Mechanics in particular non-linear problems of Thermoplasticiti and Mechanical Systems with big number of degrees of freedom. He has more than 60 publications in scientific journals and conferences. He has published a monograph entitled Dynamics of Transient Processes and Self-synchronization of Vibrational Machines Motions. Several PhD students are doing research under his supervision.

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Plenary Lecture 2

Response of High Speed EDS Maglev Train Moving on a Suspended Guideway Shaken by Horizontal Earthquake

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Abstract: This paper presented a computational framework of interaction analysis for an EDS (electro-dynamic suspension) maglev train traveling over a suspension bridge shaken by horizontal earthquakes. The suspended guideway girder is modeled as a single-span suspended beam and the maglev train traveling over it as a series of maglev masses. To tune the magnetic forces in a maglev suspension system, an on-board hybrid LQR+PID controller is designed to control the dynamic response of a running maglev mass. Then the governing equations of motion for the suspended beam associated with all the controlled maglev masses are transformed into a set of generalized equations by Galerkin's method, and solved using an incremental-iterative procedure. Numerical investigations demonstrate that when a controlled maglev train travels over a suspended guideway shaken by horizontal earthquakes, the proposed hybrid controller has ability to reduce the vehicle's acceleration response for ride quality.

Brief Biography of the Speaker: Dr. J. D. Yau got his Ph.D. from National Taiwan University (NTU) in 1996. After serving as a chair-engineer at the Kuan-Tech Engineering Consultants Co. at Taichung in Taiwan (1997-1999), he joined the faculty at TamKang University (1999) where he has served as Assistant Professor (1999-2003), Associate Professor (2003-09), and Chair (2004-2007) in the Department of Architecture and Building Technology. In 2010, Dr. Yau became a Professor of Tamkang University, and an Adjunct Professor of Zhejiang University (2011-2013), a Visiting Professor of East China Jiao Tong University in China (2011-2014). Dr. He is also a Managing Supervisor of the Chinese Society of Wind Engineering (2012-2014). Dr. Yau has published over 60 referred journal papers and articles. His research area of interest is centered on:

1. Maglev dynamics of vehicle/guideway interaction
2. Vibration problems of high speed rails
3. Geometrical nonlinear analysis of framed structures
4. Direct integration methods for structural dynamics
5. Structural stability of thin plates

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Plenary Lecture 3

Planning the Shrinking Cities: New Approaches for the Twenty-First Century

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Abstract: Shrinkage has increasingly become a “standard pathway” of urban and regional development in many European cities and regions. Shrinking is generally seen in the literature as a negative phenomenon: certain strategies may, however, trigger off positive effects, such as social networking opportunities, affordable housing, and increased sense of identity and opportunity change. Focusing on the effects of urban development should be seen as a priority, attempting to seize opportunities for the integration of a range of urban policies, making the most of scarce resources.
Facing the shrinkage it means changing our common approaches to urban planning, abandoning the growth paradigm in search of methods capable of generating a positive “De-Growth”, as Serge Latouche has defined it. Density, Quality, Greening, Sustainability, Participation, are the key words of such approach, to develop in the shrinking cities.

Brief Biography of the Speaker: Francesco Rotondo graduated with a M.S. degree in Civil Engineer from the Polytechnic University of Bari, Italy in 1999. From 2000 to 2003 He studied in the University of Pisa, Italy, and graduated in 2003 with a Ph.D. degree in Urban Planning (Sciences and Methods for the European cities and territories). Since then he has been a faculty member of the Department of Architecture and Urban Planning at the Polytechnic University of Bari, Italy, serving as an adjunct professor from 2004until 2011. In the 2012 he has been a faculty member of the Department of Civil Engineer and Architecture at the Polytechnic University of Bari, Italy, serving as an adjunct professor until now. He has been a faculty member of the Department of Architecture, Urban Planning and Transport Infrastructure at the University of Basilicata, Italy, serving as an adjunct professor from 2003 until 2012.
His research interests include urban planning and design, urban regeneration process, collaborative planning and inhabitants participation in urban planning and design, Information and Communication Technologies as tools to support Collaborative Planning.
He has participated to some European and National funded research such as Cost Actions (Towntology C21 and COST Action TU0803: Cities Re-growing Smaller - CIRES) or PRIN (research project of a national relevant interest funded by the Italian Ministry of Research).He is author of two books and more than 60 papers published in international and national journals and conference proceedings. He has also delivered keynote speeches at various international conferences.

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Plenary Lecture 4

Sustainable Mobility in Mid-Sized Cities

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Abstract: Mobility has an important impact on the overall functioning of cities and quality of life of citizens. On the other hand, motorized road traffic is associated with high levels of noise and air pollutant emissions along with congestion and other externalities, leading to considerable social and environmental costs and degradation of human health, causing less healthy and consequently less sustainable urban environments. Therefore, more sustainable transport modes such as walking and cycling are envisaged, as well as the improvement of the public transport performance. Conventionally, mid-sized cities in Portugal, as well as in other European countries, are characterized by higher densities of population and households in relation to its surroundings, mainly at the municipality level. On the other hand, the city itself is concentrated in a small urban agglomerate where most health, educational, financial and administrative facilities are located, resulting in major traffic generators and central active points of a regional coverage. Land use and mobility planning represents a key issue to achieve a more sustainable urban transportation system. For that, sustainable mobility plans can be considered the first tool towards action. These plans can be formally divided in three phases: the diagnosis of the current situation, the definition of the objectives and concept of intervention in terms of mobility, and the development of proposals for intervention. The diagnosis of the current situation can be made through the supply/demand analysis of the urban mobility system, as well as with the identification of the major mobility constraints for different modes of transport inherent to the functioning of the various subsystems of the overall transport system. In order to integrate the sustainability principles in mobility proposals, it is necessary to characterize and define the main objectives of future interventions as well as the level of priority. In this stage, the introduction of the strategic vision of the authorities responsible for the management of the city transportation system represents an important input for planning as well as its underlying commitment with the selected solutions. In order to describe the planning process framework, several proposals will be presented for four different types of urban agglomerates of mid-sized cities in Northern Portugal, namely Viana do Castelo, Barcelos, Póvoa de Lanhoso and Arcos de Valdevez. Several priority actions were identified and detailed proposals were developed for these areas that included the reorganization of land use in the central area of some cities, thus supporting walking and cycling, and represents an innovative concept of urban transformation of historical and cultural areas of interest to promote economic vitality of those areas, the integration of a multimodal approach in larger cities, the development of air quality monitoring systems, among other solutions to promote the sustainability of these cities.

Brief Biography of the Speaker: Paulo Ribeiro is an Assistant Professor of Urban and Regional Systems in the Department of Civil Engineering, University of Minho, Portugal. He is a research member of C-TAC: Territory, Environment and Construction Centre from the University of Minho. Throughout his career he has participated in a number of national and international projects, including the preparation of the Portuguese Municipal Plans for Electric Mobility under the MOBI.E program, the Sustainable Mobility Project of the Portuguese Environmental Agency, the European project ARTISTS (Arterial Streets Towards Sustainability) and several traffic and urban mobility studies. He has authored several scientific papers published in journals as well as in national and international conferences.

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