

Vibro Impact

Issue 1, April 2005

International Centre of Vibro-Impact Systems

Overview

Vibro-impact systems can be described as systems that utilise synergetic effects of multiple impacts. Vibro-impacts processes can have a detrimental effect, for example, catastrophic failures due to impact fatigue or causing the so-called 'white fingers' disease (known as the Hand-Arm Vibration Syndrome) to hammer operators. Conversely, the skilful use of these processes results in the introduction of principally new and effective technologies. Vibro-impact systems can be used in diverse areas, such as mining and construction, medical and biomechanical applications, as well as for vibration protection and ultrasonic machining. A major purpose of the ICoVIS is to bring together the expertise of vibro-impact processes accumulated in academia and industry for development of vibro-impact engineering. It is envisaged that such collaboration provided by the Centre will bridge an existing gap between the industry and academia in this area. The Centre has strong industrial links all over the world and leading UK companies (Airbus, BAE, JCB, etc.) participated in its inauguration session.

ICoVIS Inauguration

On 30 September 2004 Loughborough University welcomed a large group of academics from UK, USA, Japan, China, Russia and other countries that came to inaugurate an International Centre of Vibro-Impact Systems (ICoVIS). The inauguration session was opened by Loughborough's Pro-Vice-Chancellor for Research Professor Neil Halliwell who emphasised extensive industrial connections of Loughborough University and its leading role in the research in the vibro-impact area. This was followed by a presentation by ICoVIS President, Prof. Vladimir I. Babitsky (*Loughborough, UK*), who described new developments and challenges of vibro-impact research. The rest of the day was dedicated to thrilling presentations on the state-of-the-art topics by researchers from various scientific backgrounds and areas of study that gave a clear perspective of multidimensionality of vibro-impact applications. The following presentations were given: "Liquid Sloshing Impact with Structures" by Prof. Raouf Ibrahim (*Detroit, USA*), "Japan Today in the World on Vibration and Acoustics" by Prof. Masaaki Okuma (*Tokyo, Japan*), "Gas Seal and the Induced Vibration" by Prof. Diangui Huang (*Shanghai, China*), "Engineering Failures Due to Impact Fatigue" by Prof. Alan Johnson (*Louisville, USA*), "VMtechnology, the Most Effective Solution to Reduce Vibration Exposure for Handheld Tool Operators" by Dr Giovanni Bisutti and Dr Hugh Hunt (*Cambridge, UK*), "Damage Evolution at Dynamic Processes in Brittle Materials" by Prof. Jerzy Najar (*Bydgosz, Poland*), "Vibration-Assisted Dead-End Filtration: Experiments and Theoretical Concepts" by Prof. Curt Koenders (*Kingston, UK*) and Prof. Richard Wakeman (*Loughborough, UK*), "Structural Nonlinearities in Assembled Structures: Modelling and Forced Response Analysis" by Dr Evgeny Petrov (*London, UK*), "Vibration of Atomising Discs Subjected to a Growing Mass" by Dr Huajiang Ouyang (*Liverpool, UK*), "Numerical Bifurcation Analysis of Vibro-Impact Systems" by Dr Petri Piironen (*Bristol, UK*), "A Self Exciting System for Percussive Rotary Drilling" by Dr André D. L. Batako (*Liverpool, UK*), "Embedding Active/Passive Fibres into Metal Matrices and Clad Structures" by Dr Rupert Soar (*Loughborough,*

Photos from the ICoVIS Inauguration session



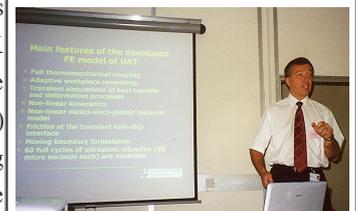
UK), and "On Vibrodynamics Of Inverted Pendulum And Submerged Solid" by Prof. Vladimir Vladimirov (Hull, UK).



Report from the 1st Topical Workshop “Ultrasonically Assisted Machining”

A topical workshop “Ultrasonically Assisted Machining” took place at Loughborough University on 1 October 2004. The workshop united representatives from both academia and industry to discuss challenges of this novel advanced technology. Industrial participation was represented by several UK companies: Airbus UK, BAE Systems, FFR Ultrasonics, and R&V Hazelwood Associates. The workshop was opened by a presentation by Prof. Vladimir Babitsky (*Loughborough University, UK*) entitled “Ultrasonically-Assisted Cutting Machine as an Autoresonant Homeostat”. The following presentations were also in the program of the day: “Ultrasonically-Assisted Machining of Intractable Materials: Experiments and FE Modelling” by Prof. Vadim V. Silberschmidt, Dr Alan Meadows, Dr Alex Mitrofanov, and Naseer Ahmed (*Loughborough University, UK*); “Ultrasonically assisted drawing of wire” by Prof. Vladimir Astashev (*Institute of Machine Studies, Russian Academy of Sciences, Moscow, Russia*); and “Ultrasonic Cutting - Frequency Aspects” by Dr Frank Rawson (*FFR Ultrasonics, Queniborough, UK*).

Photos from the 1st Topical Workshop “Ultrasonically Assisted Machining”



1st meeting of ICoVIS Scientific Committee

A first meeting of the International Scientific Committee (ISC) of the ICoVIS was held on 1 October 2004 in Loughborough, UK. Important issues of the strategic development of the Centre were discussed.

The ICoVIS Statues were approved at the ISC meeting. An Adobe Acrobat copy of the Statutes can be found [here](#).

It was decided that the next major event under the aegis of the ICoVIS would be the 1st International Conference on Vibro-Impact Systems that will be organised at Loughborough on 20-22 July 2006 (more information on this conference can be found below).



Pictured from the left are members of the ICoVIS International Scientific Committee: Prof. Vladimir Astashev (Russia), Dr. Alex Mitrofanov (ICoVIS support officer), Prof. Raouf Ibrahim (USA), Prof. Masaaki Okuma (Japan), Prof. Jerzy Najjar (Poland), Prof. Diangui Huang (China), Prof. Vadim Silberschmidt (ICoVIS Director) and Prof. Vladimir Babitsky (ICoVIS President)

1st International Conference On Vibro-Impact Systems (Loughborough, 2006)

The 1st International Conference on Vibro-Impact Systems is to be held at Loughborough University, UK on 20-22 July 2006. The website of the Conference is www.lboro.ac.uk/icovis. The First Announcement of the 1st International Conference can be found [here](#). The deadline for a pre-registration is 30 September 2005.

The Chairman of the conference is Vladimir Babitsky (UK); Co-Chairs Raouf Ibrahim (USA), and Masaaki Okuma (Japan) and Vadim Silberschmidt (UK); the Organising Committee for the Conference shall comprise leading researchers in various areas of the vibro-impact systems area.

The aim of the conference is to bring together academic and industrial experts from the fields of non-linear and structural dynamics, continuum mechanics, materials science, physics, applied mathematics, and mechanical, aerospace, civil and systems engineering to facilitate the mutual understanding of theory and applications of vibro-impact systems. The areas covered by this Conference include: excitation, synchronisation and stabilisation of vibro-impact processes; dynamics of vibro-impact machines and technological processes; vibration protection of operators and structures in harsh environment; synergistic effects of repeated impacts on solids and granular media; non-linear fluid-solid interactions; analytical, experimental and numerical methods for the analysis of vibro-impact systems and processes; synthesis and optimisation of vibro-impact systems; measurements and applications of vibro-impact processes.

The conference is linked with the 9th International Conference on Recent Advances in Structural Dynamics, organised by ISVR (Southampton, UK), and chaired by Mike Brennan, in Southampton on 17-19 July 2006. Hence, overseas delegates could participate in both events held during one week.

The papers presented at the 1st International Conference on Vibro-Impact Systems will be published in a Special Issue of the *Journal of Sound and Vibration* scheduled for 2007.

The 2nd International Conference is provisionally agreed to be held in Detroit, USA, due to the expectedly good industrial participation.

Technical Committees

The following Co-Chairs of Technical Committees (TC) of the ICoVIS were approved at the ISC meeting:

#	Technical Committee	Co-Chairs
1.	Fundamentals	Prof. Vladimir Babitsky (UK) and Prof. Leonid Manevitch (Russia)

2.	Vibration and impact protection	Prof. Masaaki Okuma (Japan) and Dr Alex Vepruk (Israel)
3.	Percussive machines	TBC
4.	Fluid-solid interaction	Prof. Raouf Ibrahim (USA) and Prof. Diangui Huang (China)
5.	Impact fatigue	Prof. Vadim Silberschmidt (UK) and Prof. Alan Johnson (USA)
6.	Dynamic friction and precise motion control	Prof. Ramutis Bansevicius (Lithuania) and Prof. Karl Popp (Germany)
7.	Mining and construction applications	TBC
8.	Dynamics of mixtures	Prof. Jim Jenkins (USA) and Prof. Curt Koenders (UK)
9.	Ultrasonic machining	Prof. Vladimir Astashev (Russia) and Prof. Vladimir Babitsky (UK)
10.	Control of fast mechanical processes	TBC
11.	Contactless metrology	TBC
12.	Medical & biomechanical applications	Prof. Jerzy Najar (Poland)

If you would like to become a member of the TC that you are currently not in, please contact the respective Co-Chair of the TC.

ICoVIS Membership (*from the ICoVIS Statutes*)

There are both individual and institutional memberships in the ICoVIS. Due to financial support of the Engineering and Physical Science Research Council (UK), the ICoVIS membership is free during the first three years of the Centre's existence, i.e. 2004, 2005 and 2006. From 2007, members may register as individual members by payment of the annual fee.

Individual membership is available to an individual person on the basis of educational qualification or professional experience, and current activity or interest in VIS. Individual Members may use the title 'Member of the International Centre of Vibro-Impact Systems' and the abbreviated affiliation 'MICoVIS' after their name. The criterion for keeping the ICoVIS membership is payment of annual subscription fee; if a member has not paid fees for two consecutive years, the membership of that person shall be deemed to have lapsed.

Institutional membership is available to institutions or groups with interests in VIS, such as, but not limited to, departments of higher education establishments, commercial enterprises or informal groups of researchers. Each interested institution can either pay 6 times the amount of individual subscription in order to make the membership available for all its employees, or each member can pay annual subscription separately.

Fellowship can be granted to individual persons, in recognition of eminent services rendered to the ICoVIS or in the domain of VIS. Each application is to be supported by two Fellows or four Members of the ICoVIS and shall be approved by the International Scientific Committee. Fellows may use the title 'Fellow of the International Centre of Vibro-Impact Systems' and the abbreviated affiliation 'FICoVIS' after their name.

The following ICoVIS Fellows have been elected in 2004: Prof. V. K. Astashev (Russia), Prof. V. I. Babitsky (UK), Prof. D. Huang (China), Prof. R. Ibrahim (USA), Prof. J. Najar (Poland), Prof. M. Okuma (Japan), Prof. V. V. Silberschmidt (UK).

Associate membership is available to an individual person under the age of 28 years who is interested in or in any way contributes to the advancement in the broad area of vibro-impact systems. Associate Members may use the title 'Associate Member of the International Centre of Vibro-Impact Systems' and the abbreviated affiliation 'AMICoVIS' after their name.

ICoVIS open to new members and ideas

The ICoVIS is open to both academic members and industrial partners working in the area of vibro-impact processes and applications.

The ICoVIS currently involves more than two dozens research centres and groups including:

- [Loughborough Centre](#) , [Loughborough University](#) , UK : [V.I. Babitsky](#)
- [Wayne State University](#) , USA: [R. Ibrahim](#)
- [Institute of Machine Studies](#), [Russian Academy of Sciences](#), Moscow, Russia: [V.K. Astashev](#)
- [ISVR](#) , [Southampton](#), UK: [M. Brennan](#)
- [Tokyo Institute of Technology](#) , Japan: [M. Okuma](#)
- [JCB Ltd](#) : [R.M. Pendlebury](#)
- [Zhengzhou University of Technology](#) , China : [Li Hua](#)
- [Uppsala University](#) , Sweden: [B. Lundberg](#)
- [Ricor Centre of Excellence in Dynamics](#) , Israel : [A.Veprik](#)
- [University of Liverpool](#) , UK : [J.E. Mottershead](#)
- [Hebei University of Science and Technology](#) , China: [Shujun Hou](#)
- [Mechanical Dynamics Lab](#) , [Niigata Institute of Technology](#) , Japan: [M. Saeki](#)
- [Department of Mechanical Engineering](#) , [University of Bristol](#) , UK: [D. Wagg & C. Truman](#)
- [Center for Intelligent Material Systems and Structures](#), [Virginia Tech](#) , USA: [D.J. Inman](#)
- [Institute of Piezomechanics](#) , [Kaunas University of Technology](#) , Lithuania: [R. Bansevicius](#)
- [Newport Corporation](#) , Irvine, USA: [V.M. Ryaboy](#)
- [BCANM - Bristol Centre for Applied Nonlinear Mathematics](#) , [University of Bristol](#) , UK : [S J Hogan](#)
- [Control and Robotics Lab](#) ., [Chiba University](#) , Japan: [H. Nishimura](#)
- [East China University of Science and Technology](#) , Shanghai, China: [M. Xiao](#)
- [BeiHang University](#) (Beijing University of Aeronautics and Astronautics), China: [J. Yuan](#)
- [ACES \(Advanced Control of Energy Systems\)](#) , [Technical University of Catalonia](#) , Spain: [G. Olivar](#)

These research groups are fully associated with the Centre (see <http://www.lboro.ac.uk/departments/mm/research/icovis/> for details); its Loughborough Centre unites some 20 researchers from five departments of the University.

ICoVIS is represented by its individual members in 25 countries including UK, USA, China, Russia, Germany, Japan, Israel, Sweden, Spain and Lithuania.

The major tool of communication with ICoVIS members is through the ICoVIS web portal and e-newsletters. Various non-ICoVIS events may be advertised on the ICoVIS website (subject to the approval of the ICoVIS Director).

ICoVIS encourages organisation of the national ICoVIS branches and networks that should have the freedom to develop in the way they choose. Any ICoVIS member can be elected as a head of the national branch. It is believed that such a structure should lead to an increase in activities and presence of the ICoVIS as well as its membership.

In the modern world all vibration studies are held under acoustics framework, whereas many important aspects of vibro-impact processes are not related to sound&vibration. These include interaction with materials/structures, material processing, mechanics of materials. Therefore, many people working with pure vibration issues are also encouraged to work with the ICoVIS.

If some institutions would like to introduce VIS topics into their educational programs, the Centre can assist them by providing bespoke short courses and workshops for students and/or employees.

News from the members

Dear ICoVIS Member,

We would like to have information about your local activities in the area of VIS for the section "News from the members". If you would like to share your news with other readers of the newsletter, please send us up to 100 words and (optionally) a photo.

In case you would like to review ICoVIS activities at a national level, the size of your contribution can be expanded.

You can also submit advertisements for scientific events, new books, or job positions relevant to ICoVIS subject areas (these will be published at the editor's discretion).

Please submit your information by email to ICoVIS e-newsletter editor (A.V.Mitrofanov@lboro.ac.uk) as WinWord file, with images in jpeg/bmp/tiff format.

