

IUTAM Symposium
The Vibration Analysis of Structures with Uncertainties
July 6 - July 9, 2009, Saint Petersburg, RUSSIA

CONFERENCE PROGRAM

Hosting Institution

Institute of Problems in Mechanical Engineering, Russian Academy of Sciences,
<http://www.ipme.ru>

Auspice Organization

International Union of Theoretical and Applied Mechanics, (IUTAM) <http://www.iutam.net>

Chairmen

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Conference Location

The Symposium will take place in **Tsarskoe Selo** (a suburb of St. Petersburg, also known as Pushkin) in a palace built for Prince V. P. Kochubei. The venue is an education centre of the Polytechnic University, and the whole Palace will be made available to the Symposium. The website <http://www.mtcenter.ru/en>. The location is Pushkin (Tsarskoe Selo) Radischeva str. 4, the phone. +7 (812) 449-54-30.

Registration

Registration desk will be open on Sunday July 5th 17.00 – 19.00 and Monday July 6th 9.00-10.00

Welcome Reception

Welcome Reception will take place on Sunday July 5th at 19.00.

Symposium Opening

The Conference Opening will take place on July 6th at 9.30.

Technical Program

Monday, July 6

Non-probabilistic and related approaches

9.00 - 10.00: Registration

9.30 - 10.30: Opening ceremony

Opening address by the Symposium Chairs (A. Belyaev and R. Langley)

Opening address by the IUTAM Representative (F. Ziegler)

State Polytechnic University of St. Petersburg. Lecture by D.G. Arsenjev

10.30 - 11.00: Coffee break

11.00 - 12.30: Key-Note Lectures Session 1.1 Chair Franz Ziegler

11.00 - 11.45 Yakov Ben-Haim (Technion - Israel Institute of Technology, Haifa, Israel),
Scott Cogan (Universite de Franche-Comte, Besancon France) Up-Dating a Linear System
with Model Uncertainty: An Info-Gap Approach

11.45 - 12.30 Dirk Vandepitte, David Moens (K.U.Leuven, Department of Mechanical
Engineering, Heverlee, Belgium) Quantification of Uncertain and Variable Model
Parameters in Non-Deterministic Analysis

12.30 - 13.00: Discussion to Session 1.1

13.00 - 14.00: Lunch

14.00 - 15.30: Key-Note Lectures Session 1.2 Chair Yakov Ben-Haim

14.00 - 14.45 Franz Ziegler, Rudolf Heuer (Vienna University of Technology, Austria)
Vibrations of layered structures with fuzzy core stiffness/fuzzy interlayer slip

14.45- 15.30 Michael Hanss, Jan Herrmann, Thomas Haag (University of Stuttgart,
Germany) Vibration Analysis of Fluid-Filled Piping Systems with Epistemic Uncertainties

15.30 - 16.00: Coffee break

16.00 - 17.20: Session 1.3 Chair Dirk Vandepitte

16.00 - 16.20 Franck Massa, Bertrand Lallemand, **Thierry Tison** (Universite Valenciennes,
France) Fuzzy vibration analysis and optimization of engineering structures

16.20 - 16.40 David Moens, Maarten De Munck, Dirk Vandepitte (K.U.Leuven, Department
of Mechanical Engineering, Heverlee, Belgium) Numerical dynamic analysis of uncertain
mechanical structures based on interval fields

16.40 - 17.00 Vladik Kreinovich (University of Texas at El Paso, USA) From Interval
Computations to Constraint-Related Set Computations: Towards Faster Estimation of
Statistics and ODEs under Interval and p-Box Uncertainty

17.00 - 17.20 Dmitry G. Arseniev, **Vladimir M. Ivanov**, Nikolai A. Berkovskiy (State
Polytechnic University of St. Petersburg, Russia) About semi-statistical method of numerical
solution of integral equations and its applications

17.20 - 18.00: Discussion to Sessions 1.2 & 1.3

Tuesday July 7

SEA related methods and wave propagation

9.00 - 10.30 Session 2.1 Key-Note Lectures Chair Alexander Belyaev

9.00 - 9.45 Robin S Langley (Cambridge University, United Kingdom) Universal eigenvalue statistics and vibration response prediction

9.45 - 10.30 Alain Le Bot (Ecole Centrale de Lyon, France) Statistical Energy Analysis and the second principle of thermodynamics

10.30 - 11.00: Coffee break

11.00 - 12.20. Session 2.2 Chair Antonio Carcaterra

11.00 - 11.20 Phil J. Shorter (ESI Group, San Diego, USA) Modeling noise and vibration transmission in complex systems

11.20 - 11.40 Rolf H. Lande (Det Norske Veritas, Hovik, Norway), Robin S. Langley (Cambridge University, United Kingdom) A power absorbing matrix for the hybrid FEA-SEA approach to vibroacoustic analysis of complex uncertain structures.

11.40 - 12.00 Christian Cabos (Germanischer Lloyd, Hamburg, Germany) Hermann G. Matthies (Technical University Braunschweig, Germany) NoiseFEM - A validated energy finite element method for structure borne sound prediction

12.00 - 12.20 Gregor Tanner, Stefano Giani (University of Nottingham, UK) Wave Transport in Complex Vibro-Acoustic Structures in the High-Frequency Limit

12.20 - 13.00: Discussion to Sessions 2.1 & 2.2

13.00 - 14.00: Lunch

14.00 - 15.30: Session 2.3 Key-Note Lectures Chair Robin Langley

14.00 - 14.45 Alexander K. Belyaev (Institute of Problems in Mechanical Engineering, Russian Academy of Sciences, Russia) Benchmark study of three approaches to propagation of harmonic waves in randomly heterogeneous elastic media

14.45 - 15.30 Antonio Carcaterra (University of Rome La Sapienza, Italy) Minimum-variance-response and irreversible energy confinement

15.30 - 16.00: Coffee break

16.00 - 17.20: Session 2.4 Chair Gerhard Schuëller

16.00 - 16.20 Eric Savin (Aeroelasticity and Structural Dynamics, ONERA Chatillon cedex, France) High-frequency vibrational power flows in randomly heterogeneous structures

16.20 - 16.40 Antonio Culla (Universita di Roma "La Sapienza", Italy), Walter d'Ambrogio (Università dell'Aquila, Italy), Annalisa Fregolent (Universita di Roma "La Sapienza", Italy) Uncertainty Propagation in SEA using Sensitivity Analysis and Design of Experiments

16.40 - 17.00 Vitaly A. Kuzkin, Anton M. Krivtsov (State Polytechnic University of St. Petersburg, Russia) Thermo-Mechanical Effects in Crystals

17.00 - 17.20 Luke Humphry (Cambridge University, United Kingdom) Predicting shock response in uncertain structures using the hybrid method

17.20 - 18.00: Discussion to Sessions 2.3 & 2.4

Wednesday July 8

Probabilistic Methods, Session 1

9.00 - 10.30. Session 3.1. Key-Note Lectures Chair Stewart McWilliam

9.00 - 9.45 Gerhard I. Schuëller (University of Innsbruck, Austria) Uncertainty quantification and reliability estimation in linear dynamics

9.45 - 10.30 Giovanni Falsone, D. Settineri (Universita di Messina, Italy) Time domain analysis of structures with stochastic material properties

10.30 - 11.00: Coffee break

11.00 - 12.20: Session 3.2. Michael Hanss

11.00 - 11.20 Christophe Lecomte (Cambridge University, United Kingdom) Vibration Analysis of an Ensemble of Structures using a Theory of Stochastic Linear Systems

11.20 - 11.40 Yoshihiro Kanno (University of Tokyo, Japan), **Izuru Takewaki** (Kyoto University, Japan) Dynamic Steady-State Analysis of Structures under Uncertain Harmonic Loads via Semidefinite Program

11.40 - 12.00 Sergey M. Ermakov (St. Petersburg State University, Russia) Stochastic Computation Methods in Multidimensional Problems

12.00 - 12.20 Julian F. Dunne, S. Riefelyna (University of Sussex, Brighton, United Kingdom) Structural Uncertainty Identification using Vibration Mode Shape Information

12.20 - 13.00: Discussion to Sessions 3.1 & 3.2

13.00 - 14.00: Lunch

14.00 - 21.00: Social Program

14.00 - 15.30: Guided tour - “Parks of Tsarskoe Selo”

15.30 - 17.30: Guided tour - “Katerine Palace”

18.00: Conference Dinner

Thursday July 9

Probabilistic Methods, Session 2 + Applications

9.00 - 10.30: Session 4.1 Key-Note Lectures Chair Giovanni Falsone

9.00 - 9.45 Helmut J. Pradlwarter (University of Innsbruck, Austria) A procedure to assess the reliability of uncertain linear structures subjected to dynamic excitation

9.45 - 10.30 Stewart McWilliam (University of Nottingham Malaysia Campus, Semenyih, Malaysia) Uncertain MEMS resonators

10.30 - 11.00: Coffee break

11.00 - 12.20: Session 4.2 Chair Helmut Pradlwarter

11.00 - 11.20 Sondipon Adhikari and L Pastur (Swansea University, United Kingdom) Extremely strong convergence of eigenvalue-density of linear stochastic dynamical systems

11.20 - 11.40 Prasanth B. Nair (University of Southampton, United Kingdom) Stochastic subspace projection schemes for dynamic analysis of uncertain systems

11.40 - 12.00 Tore Butlin, Robin Langley (Cambridge University, United Kingdom) An efficient model of a periodic structure with localised non-linearities

12.00 - 12.20 Stephen Cooke, Robin Langley (Cambridge University, United Kingdom) Computing boundary layer wavenumber-frequency spectra using computational fluid dynamics

12.20 - 13.00: Discussion to Sessions 4.1 & 4.2

13.00 - 14.00: Lunch

14.00 - 15.30: Session 4.3 Chair Alain Le Bot

Applications

14.00 - 14.20 Katrin Ellermann (Hamburg University of Technology, Germany) Analysis of offshore systems in random waves

14.20 - 14.40 Paul V. Krot (Iron and Steel Institute, National Academy of Science of Ukraine, Dnepropetrovsk, Ukraine) Statistical Dynamics of the Rolling Mills

14.40 - 15.00 Y. J. Chan, David J. Ewins (Imperial College London, United Kingdom) The application of robust design strategies on managing the uncertainty and variability issues of the blade mistuning problem

15.00 - 15.20 Regis Cottreau, Hachmi Ben Dhia, Didier Clouteau (Ecole Centrale Paris, France) Localized modeling of uncertainty in the Arlequin framework

15.20 - 15.40. Discussion to Sessions 4.1

15.40 - 16.00: Coffee break

16.00 - 17.30: Closing Ceremony. General Discussion

16.00 - 17.00: Open Discussion: The Vibration Analysis of Structures with Uncertainties. Present and Future.

17.00 - 17.30: Closing Ceremony

Young Scientist's Award

Closing address by the Symposium Scientific Committee

Closing address by the IUTAM Representative (F. Ziegler)