

TIME TABLE

TIME	Monday	Tuesday	Wednesday	Thursday	Friday
	May 27	May 28	May 29	May 30	May 31
9.00 - 9.45	Registration	Hagedorn	Hagedorn	Skelton	Skelton
9.45 - 10.30	Hagedorn	Hagedorn	Hagedorn	Skelton	Skelton
11.00 - 11.45	Skelton	Preumont	Spelsberg-K.	Preumont	Preumont
11.45 - 12.30	Skelton	Preumont	Spelsberg-K.	Preumont	Preumont
14.00 - 14.45	Preumont	Akay	Skelton	Gawronski	
14.45 - 15.30	Preumont	Akay	Skelton	Gawronski	
16.00 - 16.45	Akay	Spelsberg-K.	Gawronski	Spelsberg-K.	
16.45 - 17.30	Akay	Spelsberg-K.	Gawronski	Spelsberg-K.	

ADMISSION AND ACCOMMODATION

Applicants must apply at least one month before the beginning of the course. Application forms should be sent on-line through our web site: <http://www.cism.it> or by post.

A message of confirmation will be sent to accepted participants. If you need assistance for registration please contact our secretariat.

The 700,00 Euro registration fee includes a complimentary bag, four fixed menu buffet lunches (Friday not included), hot beverages, on-line/downloadable lecture notes and wi-fi internet access.

A limited number of participants from universities and research centres who are not supported by their own institutions can be offered board and/or lodging in a reasonably priced hotel. Requests should be sent to CISM Secretariat by **March 27, 2013** along with the applicant's curriculum and a letter of recommendation by the head of the department or a supervisor confirming that the institute cannot provide funding. Preference will be given to applicants from countries that sponsor CISM.

Information about travel and accommodation is available on our web site, or can be mailed upon request.

For further information please contact:

CISM
 Palazzo del Torso
 Piazza Garibaldi 18
 33100 Udine (Italy)
 tel. +39 0432 248511 (6 lines)
 fax +39 0432 248550
 e-mail: cism@cism.it



ACTIVE AND PASSIVE VIBRATION CONTROL OF STRUCTURES

Advanced School
 coordinated by

Peter Hagedorn
 Technical University Darmstadt
 Germany

Gottfried Spelsberg-Korspeter
 Technical University Darmstadt
 Germany

Udine, May 27 - 31, 2013

ACTIVE AND PASSIVE VIBRATION CONTROL OF STRUCTURES

Active and Passive Vibration Control of Structures form an issue of very actual interest in many different fields of engineering, for example in the automotive and aerospace industry, in precision engineering (e.g. in large telescopes), and also in civil engineering. The course intends to bring together engineers of different background, and it will try to fill gaps between structural mechanics, vibrations and modern control theory. It will also establish links between the different applications in structural control.

To a large extent, in vibration control it is still common practice to regard the design of mechanical structures and their damping and control as different issues. Thus they are often are

treated sequentially, with the design of the structure carried out first, followed later by designing the active and passive vibration control. Similarly, in the standard curricula at most universities, the mechanical modelling and the design of structures, as well as their control, are treated as separate subjects. The present course intends to fill some of the gaps between these different issues. The intention is to give a solid foundation of the mechanical modelling and the vibration control for discrete and continuous structures, with an emphasis on the interfaces of the different disciplines.

A thorough introduction to the relevant theory both of the mechanical modelling and the vibration control theory are presented and the most important

design goals are discussed. Various strategies for modelling complex mechanical structures are given and an introduction to active, passive and semi-active strategies for vibration control are discussed.

In a number of examples from different areas it will be shown that a comprehensive approach, in which both the mechanical design problem and the development of suitable controls are considered simultaneously, can present considerable advantages. Even in research communities, the problem of integrating structure and control design is not always satisfactorily dealt with. As opposed to a control system pushing a structure away from its equilibrium, it can be far

more promising to modify the equilibrium positions of the uncontrolled structure in such way as to achieve the desired shapes with moderate control effort, possibly in such a way that no control power at all is required to hold the new shape. Tensegrity structures will be discussed in this context.

Summarizing, the course will offer a unified view on active and passive control, and the mechanical modelling of structures. The underlying theory is presented and applied to different challenging engineering examples. The course is directed to young researchers, to doctoral students and also to engineers working in fields related to structures, vibrations and control.

PRELIMINARY SUGGESTED READINGS

André Preumont: Vibration Control of Active Structures, 3rd edition, Springer 2011.

Peter Hagedorn, Anirvan DasGupta: Vibrations and Waves in Continuous Mechanical Systems, 1st edition, Wiley, 2007.

Robert Skelton: A Unified Algebraic Approach to Control Design, Taylor and Francis, 1996.

Robert Skelton: Dynamic Systems Control, John Wiley and Sons, New York, 1988.

Leonard Meirovitch: Fundamentals of Vibrations, McGraw-Hill Book Company, 2nd edition, 2003.

Wodek Gawronski: Dynamics and Control of Antennas and Telescopes, Springer, 2008.

Wodek Gawronski: Advanced Structural Dynamics and Active Control of Structures, Springer, 2004.

INVITED LECTURERS

Peter Hagedorn - FNB, TU Darmstadt, Germany
5 lectures on:
Equations of motion for discrete and continuous mechanical systems.

Gottfried Spelsberg-Korspeter - FNB, TU Darmstadt, Germany
6 lectures on:
Variational principles in mechanics and control.

André Preumont - ULB Brussels, Belgium
8 lectures on:
Smart actuators for active and semi-active control, control-structure interaction.

Robert Skelton - University of California, San Diego, CA, USA
8 lectures on:
Structure and design of control systems.

Adnan Akay - Bilkent University, Turkey
4 lectures on:
Physics and modelling of structural damping.

Wodek Gawronski - Jet Propulsion Laboratory, Pasadena, CA, USA
4 lectures on:
Controlling antennas and telescopes.

LECTURES

All lectures will be given in English. Lecture notes can be downloaded from CISM web site, instructions will be sent to accepted participants.

**ACTIVE AND PASSIVE VIBRATION CONTROL
OF STRUCTURES**

Udine, May 27 - 31, 2013

Application Form
(Please print or type)

Surname _____

Name _____

Affiliation _____

Address _____

E-mail _____

Phone _____ Fax _____

Method of payment upon receipt of confirmation (Please check the box)

The fee of Euro 700,00 includes IVA/VAT tax and excludes bank charges

I shall send a check of Euro _____

Payment will be made to CISM - Bank Account N° 094570210900,
VENETO BANCA - Udine (CAB 12300 - ABI 05035 - SWIFT/BIC
VEBHIT2M - IBAN CODE IT46 N 05035 12300 09457 0210900).
Copy of the receipt should be sent to the secretariat

I shall pay at the registration counter with check, cash or VISA
Credit Card (Mastercard/Eurocard, Visa, CartaSi)

**IMPORTANT: CISM is obliged to present an invoice for the above sum.
Please indicate to whom the invoice should be addressed.**

Name _____

Address _____

C.F.* _____

VAT/IVA* No _____

(* Only for EU residents or foreigners with a permanent business activity in Italy.)

Only for Italian Public Companies

I ask for IVA exemption (ex law n. 537/1993 - art. 14 comma 10).

Privacy policy: I understand that data received via this form will be used only to provide information about CISM and its activities, within the limits set by the Italian legislative decree no. 196/2003 and subsequent amendments.

Complete information on CISM's privacy policy is available at www.cism.it.

I have read the "Admission and Accommodation" terms and conditions and agree.

Date _____ Signature _____