Short Course on
ACTIVE VIBRATION CONTROL

By

Prof. André PREUMONT
Visiting Professor of INSA-LaMCoS-DCS

April 24-26, 2007- Lyon – France

- **Dynamics of Electromechanical Systems**
- **Smart Materials and Structures**
- **Piezoelectric Transducers**
- **Actuation & Sensing**
- **Collocated / non-collocated control**
- **Active & semi-active damping**
- **Active & semi-active isolation**
- **Magneto-Rheological (MR) Fluids**
- **Robustness**
- **Discrete and distributed spatial filters**
- **Vibro-acoustics**
- **Precision Engineering**
- **Adaptive Optics**
- **Earthquake response of civil structures**

SCOPE

This introductory course is targeted at structural engineers in industry, research centers and universities, willing to acquire some background in smart structures and active vibration control.
he course may also be useful to control engineers willing to understand the key issues in control-structure interaction and in piezoelectric transduction mechanisms. The applications covered during the course belong to precision engineering, aerospace, civil engineering, transportation and vibroacoustics. The course will offer ample time for discussion and networking.

The lectures are based on the two books :
Vibration Control of Active Structures, An Introduction, 2nd Edition, Kluwer, 2002.
Mechatronics : Dynamics of Electromechanical and Piezoelectric Systems, Springer, 2006.

ABOUT THE LECTURER

André PREUMONT is professor of Mechanical Engineering and Robotics and director of the *Active Structures Laboratory* (ASL) at the *Université Libre de Bruxelles* (ULB), and part-time professor at the university of Liège. He is also invited professor at INSA-Lyon.
He is the author of four textbooks in Random Vibration, Vibration Control and Mechatronics. He has been involved in structural dynamics and smart structures for more than 20 years. He was the recipient of the *Five-year FNRS Scientific Prize in Applied Exact Sciences* in 2000.

Location and information :

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BP 21 32
69603 VILLEURBANNE CEDEX - FRANCE
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E-mail : formation.cast@insa-lyon.fr

Registration fee – individual price :

- The registration fee is **1230.00 € HT.**
- The registration fee for university or technical colleges'representatives is **861.00€ HT**

The fee includes a copy of the 2 course textbooks, a copy of the slides (paper and CD-ROM), the lunches and refreshments, as well as the course dinner.

A 50 % deposit will confirm your booking. Balance to be paid before the training start.

Program
ACTIVE VIBRATION CONTROL

Day 1 :

13 :00 Welcome
14 :00 **Module 1** : Introduction, smart materials and structures, modelling for control, modal truncation.
15 :15 Coffee break
15 :45 **Module 2** : Electromechanical transducers, Lagrangian dynamics of electromechanical systems, applications (AMD, geophone, ...). Piezoelectric transducers, piezoelectric beams and plates, applications (Rosen's transformer,...), piezoelectric fibers.
17 :00 Discussion. End day 1

Day 2 :

9 :00 **Module 3**: Collocated versus non-collocated control systems. The virtues of collocation. Robustness issues.
10 :15 Coffee break
10 :45 **Module 4** : Active damping with collocated pairs
12 :00 Lunch
14 :00 **Module 5** : Applications to large trusses, cable-structures, cable-stayed bridges.
15 ;15 Coffee break
15 :45 **Module 6** : Vibration isolation, sky-hook damper, Stewart platform, semi-active isolation, magneto-rheological (MR) fluid technology.
17 :00 Discussion. End day 2
19 :30 Course dinner

Day 3 :

9 :00 **Module 7**: Earthquake response of civil structures : comparison of various passive (TMD), active and semi-active strategies.
10 :15 Coffee break
10 :45 **Module 8**: Spatial filtering : distributed piezoelectric sensors, discrete sensor arrays, spatial aliasing, electrode tailoring, application in vibroacoustics : baffled plate.
12 :00 Discussion. End of the AVC course, Lunch.
14 :00 Presentation of LaMCoS Laboratory activities, and the researches of its Dynamic and Control of Structures (DCS) team.
Presentation of active control devices and structures dynamics devices
15 :30 Discussion. End.

Registration form

Please complete this form and return by : fax to (00) 33 4 72 44 34 24 or letter : INSACAST, BP 2132 69603 VILLEURBANNE CEDEX or mail : formation.cast@insa-lyon.fr

I wish participate in the course « ACTIVE VIBRATION CONTROL »

First name.....last name……

Entreprise or university or technical colleges'representatives..... ……

service :.....

Adress : ……

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Zip/postal code : ……

State……Country :……

Phone : ……E-mail :……

Accomodations et directions

Please consult INSACAST web site, to obtain the list of local hotels and access map to INSA de LYON

- **hotel list**
- **Access map**