

TIME TABLE

TIME	Monday September 17	Tuesday September 18	Wednesday September 19	Thursday September 20	Friday September 21
9.00 - 9.45	Registration	Brüls	Breedveld	Valášek	Arnold
9.45 - 10.30	Schiehlen	Brüls	Breedveld	Valášek	Arnold
11.00 - 11.45	Eberhard	Breedveld	Arnold	Eberhard	Cuadrado
11.45 - 12.30	Eberhard	Breedveld	Arnold	Eberhard	Cuadrado
14.30 - 15.15	Arnold	Valášek	Valášek	Breedveld	
15.15 - 16.00	Arnold	Valášek	Valášek	Breedveld	
16.30 - 17.15	Cuadrado	Eberhard	Brüls	Cuadrado	
17.15 - 18.00	Cuadrado	Eberhard	Brüls	Cuadrado	



ADMISSION AND ACCOMMODATION

Applicants must apply at least one month before the beginning of the course. Application forms can be sent by post or on-line through our web site: <http://www.cism.it>. A letter of confirmation will be sent to accepted participants.

The registration fee is 550,00 €.

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 **July 17, 2007** together with the applicant's curriculum and a letter of recommendation by the head of the department or supervisor confirming that the institute cannot provide funding. Preference will be given to applicants from countries which sponsor CISM.

The Deutsche Forschungsgemeinschaft offers scholarships to German students (please contact Mr Höfeld, DFG, Kennedyallee 40, 53175 Bonn, +49 (0) 228 885 2321, <http://www.dfg.de/>).

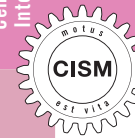
Information about travel and accommodation are available at http://www.cism.it/cism/travel_reach.htm, or can be mailed upon request.

Please note that the Centre will be closed for summer vacation the first three weeks in August.

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
<http://www.cism.it>

Centre International des Sciences Mécaniques
International Centre for Mechanical Sciences



ACADEMIC YEAR 2007
The Zyczkowski Session

SIMULATION TECHNIQUES FOR APPLIED DYNAMICS

*Advanced School
Coordinated by*

Martin Arnold
University of Halle-Wittenberg
Germany

Werner Schiehlen
University of Stuttgart
Germany

Udine, September 17 - 21, 2007

SIMULATION TECHNIQUES FOR APPLIED DYNAMICS

In engineering, dynamical systems consist of mechanical, electrical and/or hydraulic components as well as control devices with computer hardware and software. The design of such systems requires advanced modelling and simulation techniques to analyse the dynamical behaviour of coupled physical phenomena. The methods and software tools of multibody dynamics proved to be a powerful platform for the simulation of these heterogeneous engineering systems. The non-mechanical system components are either considered by appropriate extensions of classical multibody system simulation tools or by the

coupling with standard simulation tools from other disciplines (e.g. hydraulics or control systems) in a co-simulation framework. Alternatively, the heterogeneous engineering system may be described in a unified modelling framework like bond graph modelling. The unified modelling approach as well as the co-simulation techniques are used with great success in industrial applications. The course "Simulation Techniques for Applied Dynamics" starts with the basics in multibody dynamics and in port-based modelling and focuses on advanced modelling and simulation techniques for

heterogeneous systems with special emphasis on robust and efficient numerical solution techniques and on a large variety of applied problems including case studies of co-simulation in industrial applications, methods and problems of model based controller design, optimization and real-time applications. The aim of the course "Simulation Techniques for Applied Dynamics" is to provide detailed knowledge on modelling and simulation of advanced mechatronic systems with applications to dynamical analysis and model based controller design. The lecturers who come from five European

countries are experts in this field that ranges from basic theoretical aspects to the state-of-the-art in industrial high-end applications.

The course is addressed to: Engineers, mathematicians and physicists from industry and research institutes, who are concerned with system dynamics, control and computer simulation of mechanical and mechatronic systems. Research scientists, postgraduate and graduate students with interests in theoretical background and practical applications of computer simulation in applied dynamics.

PRELIMINARY SUGGESTED READINGS

Ascher, U. and Petzold, L.R.: "Computer Methods for Ordinary Differential Equations and Differential-Algebraic Equations". SIAM, Philadelphia, 1998.

Breedveld, P.C., "Port-Based modeling of mechatronic systems". Mathematics and Computers in Simulation 66, Elsevier, pp 99 -127, 0378-4754, 2004.

Eberhard, P. and Schiehlen, W.: "Computational Dynamics of Multibody Systems: History, Formalisms, and Applications". Journal of Computational and Nonlinear Dynamics 1, (06), pp.3 -12.

Garcia de Jalon, J. and Bayo, E., "Kinematic and Dynamic Simulation of Multibody Systems, The Real-Time Challenge". Springer-Verlag, New York, 1994. Chapters 1-5, 7-8, 11. Available free at <http://mat21.etsii.upm.es/mbs/bookPDFs/bookGjB.htm>

Gérardin, M. and Cardona, A.: "Flexible Multibody Dynamics - A Finite Element Approach". John Wiley & Sons, New York, 2001. Chapters 1, 2, 7, 10.

Schiehlen, W.: "Multibody System Dynamics: Roots and Perspectives". Multibody System Dynamics 1, (1997), pp. 149-188.

Shabana, A.: "Flexible Multibody Dynamics: Review of Past and Recent Developments". Multibody System Dynamics 1, (1997), pp. 189-222.

INVITED LECTURERS

Martin Arnold - Martin Luther University Halle-Wittenberg, Germany
6 lectures on: Numerical methods for simulation in applied dynamics; Modular time integration methods for mechatronic systems; Numerical problems in real-time applications.

Peter C. Breedveld - University of Twente, The Netherlands
6 lectures on: Port-based modelling of multidomain physical systems; Basics of bond graph modelling and simulation; Simulation of multidomain physical systems: Examples and case studies.

Olivier Brüls - University of Liège, Belgium
4 lectures on: Integrated simulation of flexible multibody systems; Simulation and control of mechatronic systems with flexible components.

Javier Cuadrado - Universidad de La Coruña, Spain
6 lectures on: Experimental dynamics of multibody systems; Real-time computational kinematics and dynamics of multibody systems; Application of real-time simulation of mechatronic systems.

Peter Eberhard - University of Stuttgart, Germany
6 lectures on: Multibody dynamics; Modelling of mechanical and mechatronic systems; Dynamical simulation and optimization of mechatronic systems; Flatness based control.

Werner Schiehlen - University of Stuttgart, Germany
1 lecture on: Introduction to applied dynamics.

Michael Valásek - Czech Technical University in Prague, Czech Republic
6 lectures on: Co-Simulation techniques for modelling and simulation of mechatronic systems; Model based control of mechatronic systems; Application to integrated chassis control.

LECTURES

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

SIMULATION TECHNIQUES FOR APPLIED DYNAMICS

Udine, September 17 - 21, 2007

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 550,00 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 05418 - SWIFT AMBPIT2M - IBAN
CODE IT83Z 05418 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 _____