# TIME TABLE

(Registration on Monday at 8:30)

<table>
<thead>
<tr>
<th>Day</th>
<th>September 19</th>
<th>September 20</th>
<th>September 21</th>
<th>September 22</th>
<th>September 23</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td>Maugin</td>
<td>Maugin</td>
<td>Altenbach</td>
<td>Maugin</td>
<td>deBorst</td>
</tr>
<tr>
<td></td>
<td>9.00 - 9.45</td>
<td>9.45 - 10.30</td>
<td>11.00 - 11.45</td>
<td>11.45 - 12.30</td>
<td></td>
</tr>
<tr>
<td>Tuesday</td>
<td>Steinmann</td>
<td>Eremeyev</td>
<td>Steinmann</td>
<td>Maugin</td>
<td>Steinmann</td>
</tr>
<tr>
<td></td>
<td>9.45 - 10.30</td>
<td>11.00 - 11.45</td>
<td>11.45 - 12.30</td>
<td>14.30 - 15.15</td>
<td>16.30 - 17.15</td>
</tr>
<tr>
<td>Wednesday</td>
<td>Steinmann</td>
<td>Eremeyev</td>
<td>deBorst</td>
<td>Eremeyev</td>
<td>Steinmann</td>
</tr>
<tr>
<td></td>
<td>11.00 - 11.45</td>
<td>14.30 - 15.15</td>
<td>16.30 - 17.15</td>
<td>17.15 - 18.00</td>
<td></td>
</tr>
<tr>
<td>Thursday</td>
<td>Eremeyev</td>
<td>Maugin</td>
<td>deBorst</td>
<td>Eremeyev</td>
<td>Steinmann</td>
</tr>
<tr>
<td></td>
<td>11.45 - 12.30</td>
<td>15.15 - 16.00</td>
<td>17.15 - 18.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Friday</td>
<td>Forest</td>
<td>Forest</td>
<td>Steinmann</td>
<td>deBorst</td>
<td>Steinmann</td>
</tr>
<tr>
<td></td>
<td>14.30 - 15.15</td>
<td>16.30 - 17.15</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

# 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 July 19, 2011 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.

The Deutscher Akademischer Austausch Dienst (DAAD) and the Deutsche Forschungsgemeinschaft (DFG) offer support to German students. Please contact:

**DAAD**, Kennedyallee 50, 53175 Bonn  
tel. +49 (228) 882-0  
email: postmaster@daad.de  
web site: [http://www.daad.de/de/kontakt.html](http://www.daad.de/de/kontakt.html)

**DFG**, Kennedyallee 40, 53175 Bonn  
tel. +49 (228) 885 2655  
email: ing4@dfg.de  
web site: [http://www.dfg.de](http://www.dfg.de)

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  
email: cism@cism.it

---

**Udine, September 19 - 23, 2011**

---

**Generalized Continua**  
**From the Theory to Engineering Applications**

---

**ACADEMIC YEAR 2011**  
**The Herrmann Session**  
**Centre International des Sciences Mécaniques**  
**International Centre for Mechanical Sciences**

---

**Advanced School**  
coordinated by  
**Holm Altenbach**  
Martin-Luther-University  
Halle-Wittenberg  
Germany

**Victor A. Eremeyev**  
South Federal University  
and South Scientific Center of RASci  
Rostov on Don, Russian Federation
GENERALIZED CONTINUA FROM THE THEORY TO ENGINEERING APPLICATIONS

The need of generalized continua models is coming from the practice — complex material behaviour cannot be presented in all cases by the classical Cauchy continua. Generalized Continua are in the focus of scientists from the end of the 19th century. A first summary was given in 1909 by the Cosserat brothers. After World War II a true renaissance in this field occurred with a publication of Ericksen & Truesdell in 1958. Further developments were connected with the fundamental contributions of, among others, Kröner (Germany), A.C. Eringen and Palmov (Soviet Union), Nowacki (Poland), Eringen (USA), and Maugin (France). Strong interest in the field is checked and at present the attention will be focussed on the most recent research items: new models, application of well-known models to new problems, micro-macro aspects, computational effort, and possibilities to identify the constitutive equations. The Mechanics of Generalized Continua is an established research topic since the end of the 50s — early 60s of the last century. The starting point was the monograph of the Cosserat brothers from 1909 Théorie des corps déformables and some previous works of such famous scientists like Lord Kelvin. All these contributions were focussed on the fact that in a continuum one has to define translations and rotations independently (or in other words, one has to establish force and moment actions as it was done by Euler). The reason for the revival of generalized continua is that some effects of the mechanical behaviour of solids and fluids could not be explained by the available classical models. Examples of this are the turbulence of a fluid or the behaviour of solids with a significant and very complex microstructure. Since the suggested models satisfy all requirements from Continuum Theromechanics (the balance laws were formulated and the general representations of the constitutive equations were suggested) the scientific community accepted for a while but missed real applicable developments. Indeed, for practical applications the developed models were not useful. The reason for this was a gap between the formulated constitutive equations and the possibilities to identify the material parameters. As often the case one had much more parameters compared to classical models. During the last ten years the situation has drastically changed. More and more researches emerged, being kindled by the partly forgotten models since now one has available much more computational possibilities and very complex problems can be simulated numerically. In addition, with the increased attention paid to a large number of materials with complex microstructure and a deeper understanding of the meaning of the material parameters (scale effects) the identification becomes much more well founded. We have thus contributions describing the micro- and macro-behaviours, new existence and uniqueness theorems, the formulation of multi-scale problems, etc. In addition, generalized continua models are not included in the actual BSc or MSc programs.

PRELIMINARY SUGGESTED READINGS


INVITED LECTURERS

Holm Altenbach - Martin-Luther-University Halle-Wittenberg, Germany

René de Borst - Eindhoven University of Technology, The Netherlands
6 lectures on: Gradient inelasticity. Theory and computational aspects. Constitutive theories for non-standard plasticity or damage formulations either involve higher-order (displacement) gradients, rotational degrees-of-freedom (Cosserat continua), or non-local averaging, efficient and robust numerical methodologies to handle non-standard continuum theories, with an emphasis on Cosserat and gradient theories, contemporary approaches, including isogeometric analysis methods.

Victor A. Eremeyev - South Federal University and South Scientific Center of RASci, Rostov on Don, Russian Federation

Samuel Forest - Mines ParisTech, France

Gérard A. Maugin - Université Pierre et Marie Curie, France

Paul Steinmann - University Erlangen-Nuremberg, Germany

LECTURES

All lectures will be given in English. Lecture notes can be downloaded from CISM web site, instructions will be sent to accepted participants.
GENERALIZED CONTINUA
FROM THE THEORY TO ENGINEERING APPLICATIONS
Udine, September 19 - 23, 2011
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 05418 - SWIFT/BIC: AMBPIT2M -
IBAN CODE: IT32 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 __________________________