ADMISSION AND ACCOMMODATION

Registration fee is of 575,00 Euro + 22% Italian VAT taxes (excluded bank charges).

The registration fee includes a complimentary bag, four fixed menu buffet lunches (Friday subject to numbers), hot beverages, downloadable lecture notes and wi-fi internet access.

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.

Applicants may cancel their course registration and receive a full refund by notifying CISM Secretariat in writing (by email) no later than two weeks prior to the start of the course.

If cancellation occurs less than two weeks prior to the start of the course, a Euro 50,00 handling fee will be charged. Incorrect payments are subject to Euro 50,00 handling fee.

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 7, 2015 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.

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Information about travel and accommodation is available on our web site, 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:

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Piazza Garibaldi 18
33100 Udine (Italy)
tel. +39 0432 248511 (6 lines)
fax +39 0432 248550
e-mail: cism@cism.it
SIMILARITY, SYMMETRY AND GROUP THEORETICAL METHODS IN MECHANICS

The aim of the course is to bring together researchers in mechanics, applied physics and applied mathematics who use similarity and symmetry analysis of engineering problems in both solid and fluid mechanics, researchers who are developing significant extensions of these methods implement, and numerical analysts who develop and use such methods in numerical schemes. The powerfulness of the Lie group symmetry analysis has been extensively utilized, essentially to support the finding of analytic solutions to partial differential equations. For a given DE problem, one can algorithmically calculate its admitted point symmetries – transformations of dependent and independent variables that map a problem into itself. Knowledge of admitted symmetries allows one to construct mappings relating DE equations. For a given DE problem, solutions to partial differential equations. Beside the classical Lie symmetries extended to rotations and dilatations have been intensively dealt with by three main speakers, the powerfulness of the Lie group analysis of is further interest in setting up numerical schemes preserving the group properties of an initial boundary value problem (BVP).

PRELIMINARY SUGGESTED READINGS


George Bluman - University of British Columbia, Vancouver, Canada
5 lectures on: These five lectures will give an overview of recent developments by George Bluman and his collaborators in the field of symmetries and differential equations. • General introduction giving an extensive overview of topics to be covered. • Review of local symmetries - point, contact, higher-order. • Construction of conservation laws (CLs) - direct method to find them, connections with Noether's theorem. • Use of symmetries to construct new conservation laws from known CLs. • How to systematically find trees of equivalent but nonlocally related PDE systems for a given PDE system through the use of CLs, point symmetries and sub-systems. • How to systematically find nonlocal symmetries and nonlocal conservation laws for a given PDE system. • The multidimensional situation. • All topics will be illustrated through numerous examples.

Jean-François Ganghoffer - Université de Lorraine, Nancy, France
5 lectures on: Symmetry methods in continuum solid mechanics of materials. •Symmetries in the Lagrangian formulation of field theories. •Symmetries in continuum solid mechanics (nonlinear elasticity). •Invariance relations in nonlinear elasticity, path independent integrals. •Eshelbian mechanics. •Applications of Lie symmetries in elastoviscoplasticity: construction of invariance relations and master responses.

Ivailo Mladenov - Bulgarian Academy of Sciences, Sofia, Bulgaria
5 lectures on: The Many Faces of Elastica. •Geometrical background. •Intrinsic equations. •Symmetries. The generalized elastica. •Membrane shapes, Helix-Shaw cells. •Explicit solutions of the shape equation.

Andreas Müller - Shanghai Jiao Tong University Joint Institute, China
5 lectures on: Group Theoretical Approaches to the Mobility and Singularities of Mechanisms. •Analytic variational and mobility concepts. •Non-smooth kinematic phenomena. •Higher-order local analysis. •Generic statements. •Open problems and alternative routes.

Jan J. Slawianowski - University of Warsaw, Poland
5 lectures on: Mechanical Systems with Affine and Unitary Degrees of Freedom. •Hamiltonian and quantum systems on Lie groups and homogeneous spaces. •Rigid body and affinely-rigid body. •Affinely-invariant dynamics of affinely-rigid body. •Micromorphic mechanics and its affine generalization. •Born-Infeld theory and the mechanics of shells. •Kablukov and Vakonomic variational principles.

Martin Oberlack - Technical University, Darmstadt, Germany
5 lectures on: Symmetry Methods in Fluid Mechanics and Turbulence Theory. •Symmetries of Euler and Navier-Stokes equations in 3D. •Conservation laws of Euler and Navier-Stokes equations in 3D. •Symmetries and conservation laws of Euler and Navier-Stokes equations in reduced dimensions. •The three fundamental statistical approaches to turbulence: Lundgren-Monin-Novikov pdf equations, the Friedmann-Keller moment equations and the Hopf functional equation. •Counterpart of classical symmetries of Euler and Navier-Stokes for turbulence statistics. •New statistical symmetries of turbulence with no classical counterpart. •Symmetry invariant solutions as turbulent scaling laws derived from classical and new statistical symmetries.

LECTURES

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