

ADMISSION AND ACCOMMODATION

The course is offered in a hybrid format, allowing participants the flexibility to attend either in person or remotely via the Microsoft Teams platform.

Limited spots are available for on-site attendance and will be allocated on a first-come, first-served basis.

Registration fees:

- On-site participation, 480.00 Euro + VAT*

Includes a complimentary bag, five fixed menu buffet lunches, hot beverages, downloadable lecture notes.

Deadline for on-site application is March 8, 2024.

- Live Streaming Online Participation: 200.00 Euro + VAT*

Includes downloadable lecture notes.

Deadline for online application is March 27, 2024

Application forms should be submitted online through the website:
<http://www.cism.it>.

* where applicable (bank charges are not included) - Italian VAT is 22%.

JMBC participants should contact JMBC before proceeding with registration.

A message of confirmation will be sent to accepted participants.

Upon request a limited number of on-site participants can be accommodated at CISM Guest House at the price of 35.00 Euro per person/night (mail to: foresteria@cism.it).

CANCELLATION POLICY

Applicants may cancel their registration and receive a full refund by notifying CISM Secretariat in writing (by email) no later than:

- March 8, 2024 for on-site participants (no refund after the deadline);

- March 27, 2024 for online participants (no refund after the deadline).

Cancellation requests received after these deadlines will be charged a 50.00 Euro handling fee. Incorrect payments are subject to Euro 50,00 handling fee.

For further information please contact:

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ACADEMIC YEAR
2024

Centre International des Sciences Mécaniques
International Centre for Mechanical Sciences



FLUIDS AND FLOWS

CISM-JMBC Joint Advanced School
coordinated by

Federico Toschi

TU Eindhoven, The Netherlands

JMBC Representative

Ruud Henkes

TU Delft, The Netherlands

CISM Representative

Alfredo Soldati

TU Wien, Austria

Udine April 8 - 12 2024

FLUIDS AND FLOWS

Fluids and fluid flows are everywhere and are key to a vast number of scientific problems and industrial applications. Fluid flows can display extremely different behavior depending on the length and time-scale of observation, on the internal fluid structure, on the flow geometry and on the presence of (external) forces. With the present course we will offer to PhD students and to young researchers the possibility to have a rather complete overview of the different type of behavior that fluids can exhibit under different flowing conditions. The course will cover from the dynamics of complex fluids to the statistical description of complex flows. In particular, the course will address the physics of yield stress materials, the rheology of dense fluid suspensions, the physics of laminar and turbulent flows, the (turbulent) transport of heat and mass. Lectures will present the phenomenology, the theoretical framework and where appropriate they will illustrate numerical and experimental approaches. The organization of the course will combine the expertise of both JBMC and CISM and will address both the Dutch scientific community working on fluid mechanics as well as the international community (CISM). The course is addressed to PhD students and early-career researchers interested in fluid flows.

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.

INVITED LECTURERS

Bruno Andreotti - Laboratoire de Physique de l'Ecole Normale Supérieure / Université Paris Cité, France
8 lectures on: Two-phase flows of atmospheric and geophysical relevance.
 Viscous and turbulent suspensions. Cloud microphysics: nucleation, condensation, evaporation and collisional aggregation. Dense suspensions. Jamming transition. Sediment transport.

Roberto Benzi - University of Tor Vergata, Rome, Italy
8 lectures on: Soft glassy flows.
 Soft glassy rheology; microscopic picture with the Lattice Boltzmann Equation; the yielding transition; models of soft glassy rheology; nonlocal rheology; open questions.

Herman Clercx - TU Eindhoven, The Netherlands
4 lectures on: Physics of rotating, thermally driven turbulent flows.
 Basic aspects of rotating and stratified flows and rotating Rayleigh-Benard convection.

Alessandro Corbetta - TU Eindhoven, The Netherlands
2 lectures on: Machine learning for fluid dynamics.
 Basics of supervised learning and neural networks. Applications to measure and model turbulent flows.

Detlef Lohse - University of Twente, The Netherlands
6 Lectures on: From turbulent thermal convection to ultimate wall-bounded turbulence.
 Melting of ice. Fluid dynamical challenges of inkjet printing.

Federico Toschi - TU Eindhoven, The Netherlands
6 lectures on: Fluid dynamics turbulence.
 The laminar-turbulent transition, fully developed turbulence, from Kolmogorov 1941 to multifractals; 2d vs. 3d turbulence, turbulent passive scalar. Eulerian vs. Lagrangian turbulence.

TIME TABLE

TIME	Monday April 8	Tuesday April 9	Wednesday April 10	Thursday April 11	Friday April 12
9.00 - 9.45		Toschi	Andreotti	Andreotti	Clercx
9.45 - 10.30	Registration	Toschi	Andreotti	Andreotti	Clercx
11.00 - 11.45	Corbetta	Benzi	Toschi	Lohse	Benzi
11.45 - 12.30	Corbetta	Benzi	Toschi	Lohse	Benzi
14.00 - 14.45	Toschi	Andreotti	Lohse	Benzi	
14.45 - 15.30	Toschi	Andreotti	Lohse	Benzi	
16.00 - 16.45	Andreotti	Lohse	Benzi	Clercx	
16.45 - 17.30	Andreotti	Lohse	Benzi	Clercx	
18.00	Welcome Aperitif				