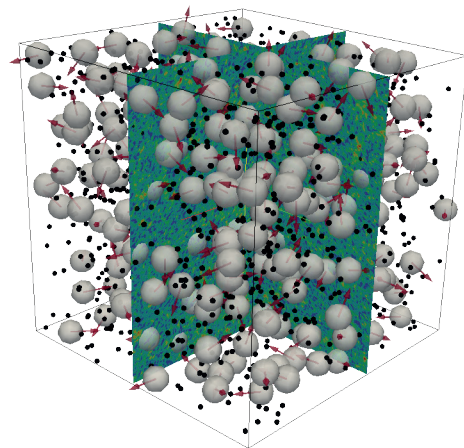


FROM STOKESIAN SUSPENSION DYNAMICS TO PARTICULATE FLOWS IN TURBULENCE

August, 29th to September, 2nd - 2022 Toulouse (France)

PROGRAM



From Stokesian suspension dynamics to particulate flows in turbulence

Organizers: E. Climent, M. Abbas, E. Keaveny

Particle-laden flows span scales ranging from the microscopic fluid-structure interactions observed in cellular biology and microsystems, to the large-scale transport of sediments by turbulent environmental flows and engineering processes. Fundamental to understanding these processes are computational methods and numerical techniques that enable large-scale simulation of these scenarios. The past 30 years have seen great progress in a diverse set of techniques, including LBM, IBM, FCM, DPD, SPH, SD, often in parallel and without discussion and interaction between the developers.

The purpose of this colloquium will be to assemble the leading experts in the computational methods to share the state-of-the-art progress and compare techniques. Additionally, leading experimental researchers will also attend to provide new challenges and ground discussion in the application to physical phenomenon. A particular focus will be devoted to the Force Coupling Method that bridges the Stokesian regime to turbulence-particles interaction.

TOPICS:

- Lagrangian and Eulerian approaches for particulate flows
- Suspension flow at low Reynolds numbers (simulations and experiments)
- Experiments and simulations of finite size particles and interaction with turbulence
- New advances on the force balance for solid particles and feedback on the flow
- Short-range interactions, lubrication, contact and friction modelling and measurements
- Fixed Cartesian mesh, dynamic re-meshing, automatic mesh refinement, meshless methods for the simulation of particles in fluids
- New advances in experimental techniques (MRI, X-Ray, Tomo-PIV, PTV ...)
- Data analysis, machine learning techniques related to particulate flows

Chairman: M.R. Maxey, Brown University, USA

We are pleased to announce the following invited lecturers:

- **S. Balachandar** (Univ. of Florida, Dept. of Mechanical and Aerospace Eng., USA)

A statistical framework for examining well-mixedness in turbulent dispersion of particles – application to room-scale airborne viral contagion

- **George Karniadakis** (Brown Univ. Dept. of Applied Math, USA)

Discovering Hidden Fluid Mechanics via Physics-Informed Neural Networks

- **Jeffrey Morris** (CCNY Levich Institute - USA)

Inertial flows of suspensions

and keynote lecturers:

- **Mickael Bourgoïn** (Laboratoire de Physique - ENS Lyon, France)

Settling of particles in quiescent fluids and turbulent flows

- **Elisabeth Lemaire** (Institut de Physique de Nice, France)

The role of contact forces in the shear-thinning behavior of non-Brownian suspensions

- **Marco Ellero** (Basque Center for Applied Math., Spain)

Fluid Dynamics of coffee extraction

Sarah Hormozi (Cornell University, USA)

Nonlinear suspensions

Blaise Delmotte (LadHyX, Ecole Polytechnique - France)

Large scale simulations of active and reactive suspensions

> Monday, August 29th

Travels / Afternoon, registration at IMFT (entrance A) from 3:00 pm to 5:00 pm

> Ice breaker cocktail at 5:00 pm

IMFT 2, Allée du Pr Camille Soula 31400 Toulouse



> Tuesday, August 30th

8:00 -9:00	Final registration
9:00 -9:30	Welcome address by E. Climent , M. Abbas and E. Keaveny
9:30 -10:00	Opening session by M.R. Maxey
10:00 -10:45	Invited Lecture #1 George Em Karniadakis - Discovering Hidden Fluid Mechanics via Physics-Informed Neural Networks
10:45 -11:15	<i>Coffee break</i>
11:15 -11:55	Session 1 (2 speakers with 20" each including questions) Particle capture by large deformable drops in turbulent flow - Cristian Marchioli A stochastic model for the drag force acting on a suspension of particles - Jesse Capecelatro
11:55 -12:25	Session 2 (2 speakers 10" and grouped questions) Developing Ultrasound Techniques to Characterize Fluid-Particle Flows - Fria Hossein Modelling turbulent dispersion using neural stochastic differential equations - Josh Williams
12:30 -14:00	<i>Lunch break</i>
14:00 -14:30	Keynote Lecture #1 Marco Ellero - Fluid dynamics of coffee extraction
14:30 -15:20	Session 3 (4 speakers 10" and grouped questions) Smoothed Particle Hydrodynamics and Discrete Element Method coupling for sus- pensions of extremely deformable particles - Fransisco Goio Implementing a hybrid immersed boundary/fictitious domain (HFD-IB) method coupled with Discrete Element Method (DEM) to consider lubrication effects between the particles in the fluid domain - Sina Hassanzadeh Collision interactions in bidispersed mixture of particles in a vertical channel flow - Karan Anand Near-wall swimming of helical ribbons - Serhat Yesilyurt

15:20 - 16:00 *Coffee break*

16:00 - 16:50 **Session 4** (4 speakers 10" and grouped questions)

Droplet dynamic in an uniform oscillatory flow, expression and impact of the Basset-Boussinesq history force - **Hadrien Godé**

Accurate advection of particle with history force at fixed numerical cost - **Divya Jaganathan**

Numerical Simulations of Sediment Transport in Transition Between Stokes and Bagnoldian Regimes **Sudarshan Konidena**

Effect of particle inertia on turbulent fluid flows dispersing particles in a channel - **Yoichi Mito**

16:50 - 17:10 **Session 5** (1 speaker with 20" including questions)

Grain-resolving simulations of submerged cohesive granular collapse - **Eckart Meiburg**



7:30 pm - Gala Dinner



RESTAURANT
Le Moai

Julien et Pauline BAILLON

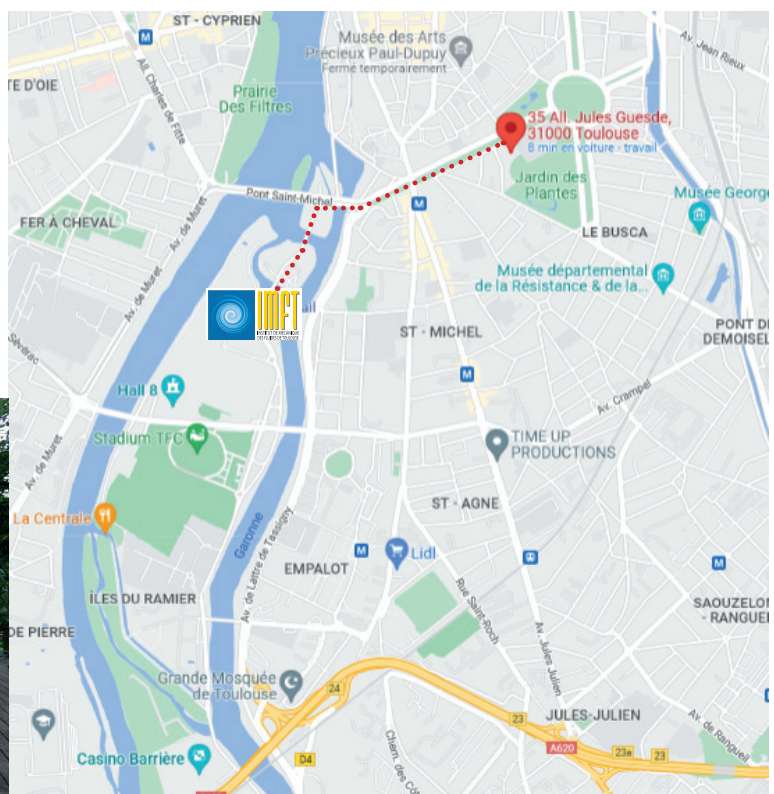
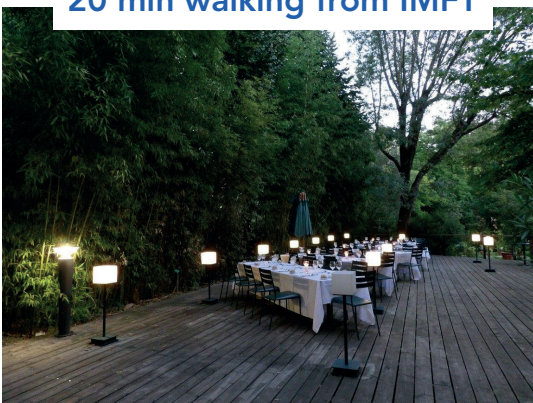


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20 min walking from IMFT



> Wednesday, August 31st

09:00 -09:45	Keynote Lecture #2 E. Lemaire - The role of contact forces in the shear-thinning behavior of non-Brownian suspensions
9:45 -10:30	Session 1 (3 speakers 10" and grouped questions) Wall-impact breakage of agglomerates in particle-laden flows: Advanced modeling based on artificial neural networks - Ali Khalifa 3D, adaptive octree-grid and conservative numerical simulation of the unbounded flow past a non-spherical obstacle - Layal Jbara Experimental lock-release turbidity currents: slope, volume fraction and settling velocity - Cyril Gadat
10:30 -11:00	<i>Coffee break</i>
11:00 -11:40	Session 2 (2 speakers with 20" each including questions) Microstructure-informed models of hydrodynamic force and torque in a static random array of spheres - Anthony Wachs Data-driven spatial decomposition algorithm for particle agglomeration in hybrid Euler-Lagrange approaches - Christophe Henry
11:40 -12:30	Session 3 (4 speakers 10" and grouped questions) A fully Eulerian, conservative and adaptive framework for the simulation of biological capsules - Damien Huet Simulation of particulate suspensions in non-linear flows: formulation of frame-invariant sub-grid corrections to the Fictitious Domain Method - Michel Orsi Direct numerical simulation of fluid-solid particles flows using front-tracking approach - Edouard Butaye Simulation of low-speed micro-scale particulate motion in gases - Duncan Lockerby
12:30 -14:00	<i>Lunch break</i>
14:00-14:30	Invited Lecture #2 S. Balachandar - A statistical framework for examining well-mixedness in turbulent dispersion of particles – application to room-scale airborne viral contagion
14:30 -15:10	Session 4 (2 speakers with 20" each including questions) Rheology of dense suspension in plane couette flow: influence of solid friction - Wim-Paul Breugem Low-Reynolds number suspensions of plate-like particles with slip - Lorenzo Botto
15:10 -16:00	Session 5 (4 speakers 10" and grouped questions) Particle wall deposition in turbulent natural convection flows in enclosed cavities with thermally active walls. - Akim Lavrinenko Modelling particle deposition of non-spherical particle mixtures in a channel flow by a fully-resolved CFD-DEM method - Leonie Walter Lagrangian statistics in a turbulent round jet - Thomas Basset Capturing the mechanisms for gravitational settling of inertial particles in turbulence using the kinetic PDF approach - Christopher Stafford
16:00 -16:30	<i>Coffee break and discussion</i>
16:30 -17:10	Session 6 (2 speakers with 20" each including questions) Dynamics and Structure in Sheared Suspensions of Fibers at High Concentration - Jason E. Butler Particle-resolved simulations of sedimenting suspensions of finite-length cylinders - Olivier Simonin
17:15 -18:30	Gathering of FCM family (Eric. Keaveny, 30 mins, and discussion)

> Thursday, September 1st

9:00 -9:45	Invited Lecture #3 Jeffrey Morris - Inertial flows of suspensions
9:45 -10:35	Session 1 (4 speakers 10" and grouped questions) Bubbles rising in laterally-confined granular suspensions - Sylvain Joubaud Particle velocity field structuration in oscillatory channel flow of a suspension - Alejandro Garcia Interaction between turbulence and bubble-induced agitation - Gabriel Ramirez Two-way coupling effects in the dusty Kolmogorov flow - Alessandro Sozza
10:35 -11:00	<i>Coffee break</i>
11:00 - 11:40	Session 3 (2 speakers with 20" each including questions) Caustics in turbulent aerosols - Bernhard Mehlig Vertical Distribution of Microplastics in Upper-Ocean Turbulence: Laboratory Modelling - Matthieu Mercier
11:40 -12:30	Session 2 (4 speakers 10" and grouped questions) Sedimentation of bidisperse and polydisperse suspensions: A Stokesian dynamics study - Heng Li Study of the mobile granular layer in bedload transport by laminar shearing flow in the tilted channel - Chong-Wei Hong On the settling of inert and reactive particle clouds in still and rotating environments: modeling iron snow in planetary interiors - Quentin Kriaa Nonlinear waves in particle-laden free surface flows - Darish Jeswin Dhas
12:30 -14:00	<i>Lunch break</i>
14:00 -14:30	Keynote Lecture #3 Mickael Bourgoïn - Settling of particles in quiescent fluids and turbulent flows
14:30 -15:10	Session 4 (2 speakers with 20" each including questions) Resuspension of large inertial particles in a turbulent swirling flow - Romain Volk Two-way coupling of falling particles in homogenous turbulence - Filippo Coletti
15:10 -16:00	Session 5 (4 speakers 10" and grouped questions) Development of Echo-LPT for the study of particle-wall interactions in dense suspensions - David Rival Experimental Study of Liquid-liquid jet fragmentation: Eulerian and Lagrangian approach - Bowen Ji Particulate elasto inertial Taylor-Couette flow - Tom Lacassagne Fully resolved simulations of a particle-laden jet - Thede Kiwitt
16:00 -16:30	<i>Coffee break</i>
16:30 -17:30	Session 6 (3 speakers with 20" each including questions) Small-scale topologies anisotropy and energy transfer in turbulent fluidization - Simon Schneiderbauer Statistics of velocity fluctuations in a finite Reynold-number concentrated fluidized suspension - Frédéric Risso Spectral analysis of bubble induced turbulence from coarse-grained simulations - Rémi Zamansky

> Friday, September 2nd

9:00 -9:30	Keynote Lecture #4 Blaise Delmotte - Large scale simulations of active and reactive suspensions
9:30 -10:30	Session 1 (3 speakers with 20" each including questions) Settling turbulent suspensions and exact coherent structures - Jake Langham Breakup of inertial particles due to viscous shear and drag stress in turbulence - Graziano Frungieri A spectral force coupling method for doubly-periodic geometries - Raul Pelaez
10:30 -11:00	<i>Coffee break</i>
11:00 -11:50	Session 2 (4 speakers 10" and grouped questions) The dynamics of filaments driven slip flows- Bethany Clarke Accelerating the force-coupling method - Hang Su Collective motion of diffusion-phoretic suspensions - Francisco Rojas-Pérez Continuum model for the transport of active Brownian particles in arbitrary flow field - Lloyd Fung
11:50 -12:00	Closing session and farewell
12:00 -13:00	Grab your bag for lunch
14:00 -16:00	Visit Toulouse from 2pm to 4pm or travel back



