Complexity, granular materials and disordered systems

17-19 November 2025 - Montpellier, France

https://cgmds2025.sciencesconf.org

Granular materials, with their disordered structures, represent a clear example of complex systems. Moreover, our environment—whether material or living—is fundamentally discrete across a wide range of scales: communities of living species, biological systems, geomaterials, stellar systems, and more.

This workshop is intended as a forum for exchange, bringing together different perspectives and approaches to discuss various issues related to granular systems as complex systems. Topics such as self-organization, self-criticality, phase transitions, bifurcations, multi-physical couplings, failure, and instabilities are among those that will be addressed during these three days.

The workshop will take place from 17 to 19 November in **Amphitheater 36.01** (Building 36) on the Triolet Campus of the University of Montpellier.

Address: *University of Montpellier - Campus Triolet, Place Eugène Bataillon, 34090 Montpellier*

To get there, you can take **tram line 1** (the blue trams) and get off at the stop "**Universités des Sciences et Lettres**". This line provides a direct connection between the two Montpellier train stations, Montpellier Saint-Roch and Montpellier Sud de France, and the university.

The **Gala dinner** will be held at **Brasserie du Corum** (*Allée du Saint-Esprit, 34000 Montpellier*).

ORGANIZING COMMITTEE

Saeid **Nezamabadi**	*LMGC - Université de Montpellier*
Farhang **Radjai**	*LMGC - CNRS, Université de Montpellier*
Olivier **Millet**	*LaSIE - La Rochelle Université*
François **Nicot**	*ISTerre - Université Savoie Mont Blanc*
Didier **Georges**	*GIPSA-lab - Université Grenoble Alpes*

Workshop Program

Monday, November 17th, 2025

14:00 - 14:10	***Welcome***
	Session M1 - *Chairman: Farhang Radjai*
14:10 - 14:50	**Granular cohesive materials: from the nanoscale up** - *Roland Pellenq, IEM, CNRS, Université de Montpellier*
14:50 - 15:05	Pore-scale hysteretic transitions in unsaturated granular media using DEM-LBM - *Nabil Younes, LMGC, CNRS, Université de Montpellier*
15:05 - 15:20	Landslides with particle breakage - *Sarath Chandra Reddy Nallala, IPGP, CNRS, Université Paris Cité*
15:20 - 15:35	Squishy granular matter: A story far beyond jamming - *Jonathan Barés, LMGC, CNRS, Université de Montpellier*
15:35 - 15:50	Understanding slow compression and decompression of granular packings by network analysis - *Kianoosh Taghizadeh, Laboratoire Navier, Université Gustave Eiffel*
15:50 - 16:10	*Questions & Discussion*
16:10 - 16:40	***Coffee break***
	Session M2 - *Chairman: François Nicot*
16:40 - 17:20	**Addressing complexity using physics-informed neural networks and autoencoders** - *Didier Georges, GIPSA-Lab, , CNRS, Université Grenoble Alpes*
17:20 - 17:35	Drying shrinkage of cement-based materials: study of water sorption and surface stresses in C-S-H by molecular simulations - *Jingyi Leng, Laboratoire Navier, Université Gustave Eiffel*
17:35 - 17:50	Numerical modeling of the behavior and rupture of plant-like cellular tissues - *Yohann Trivino, IATE, INRAE Montpellier*
17:50 - 18:05	Coupled grain shape–size effects on granular mechanical behavior - *Van Quyen Le, École Polytechnique de Montréal*
18:05 - 18:20	Optimal sensor placement and source identification for one-dimensional advection–diffusion - *Doaa Akil, LaSIE, CNRS, La Rochelle Université*
18:20 - 18:40	*Questions & Discussion*

Tuesday, November 18th, 2025

	Session T1 - *Chairman: Saeid Nezamabadi*
09:00 - 09:40	**Quasistatic behavior of model cohesive granular materials -** *Jean-Noël Roux, Laboratoire Navier, Université Gustave Eiffel*
09:40 - 09:55	Visco-frictional trapping of particles in a submerged granular medium - *Pierre Philippe, RECOVER, INRAE, Aix-Marseille Université*
09:55 - 10:10	Multiscale modeling of granular materials: from discrete mesoscale physics to continuum constitutive models - *Aoxin Li*, *RECOVER, INRAE, Aix-Marseille Université*
10:10 - 10:25	Elasto-granular interaction: the simple case of a fiber dragged in a granular medium - *Antonio Pol, IATE, INRAE Montpellier*
10:25 - 10:40	*Questions & Discussion*
10:40 - 11:10	***Coffee break***
	Session T2 - *Chairman: Farhang Radjai*
11:10 - 11:50	**The yielding transition in colloidal glasses and gels -** *Luca Cipelletti, L2C, CNRS Université de Montpellier*
11:50 - 12:05	Large-scale DEM simulations of biaxial tests with a minimal MPI implementation - *Francesco Froiio, LTDS, CNRS, École Centrale de Lyon*
12:05 - 12:20	Numerical modeling of settling particles in confined domains - *Inès Haloui, IFREMER Brest*
12:20 - 12:30	*Questions & Discussion*
12:30 - 14:00	***Lunch***
	Session T3 - *Chairman: Didier Georges*
14:00 - 14:40	**Granular materials and thermodynamics: the missing link** - *Francois Nicot, ISTerre, Université Savoie Mont Blanc*
14:40 - 14:55	Numerical simulation of particles entrained in multiphase natural convection. Application to severe accidents in fourth-generation nuclear reactors - *Bruno Turpin, CEA*
14:55 - 15:10	The importance of chemistry on cohesion: case study of geopolymers - *Romain Dupuis, LMGC, CNRS, Université de Montpellier*
15:10 - 15:25	From geometric cohesion to nonlocal rheology: Flow behavior of highly non-convex granular materials - *Emilien Azéma, LMGC, CNRS, Université de Montpellier*
15:25 - 15:40	Deformed conglomerates as model disordered granular systems: from analytical slip line solutions to triaxial DEM experiments and paleostress reconstruction - *Alfredo Taboada, Géosciences, CNRS, Université de Montpellier*
15:40 - 16:00	*Questions & Discussion*
16:00 - 16:30	***Coffee break***
	Session T4 - *Chairman: Olivier Millet*
16:30 - 17:10	**Effect of disorder on the strength properties of porous, cellular, and granular materials -** *Farhang Radjai, LMGC, CNRS, Université de Montpellier*
17:10 - 17:25	Rheology of 2D fiber-grain mixtures under shear - *Francisco Luna Guevara, IATE, INRAE Montpellier*
17:25 - 17:40	Erosion of cohesive granular materials - *Serge Mora, LMGC, CNRS, Université de Montpellier*
17:40 - 17:55	Understanding of the mechanisms for a multiscale approach to the mechanical behavior during the forming of MOX fuels - *Jean-Philippe Bayle, CEA*
~~17:55 - 18:10~~	~~On the ill-posedness of incompressible viscoplastic flows with a pressure-dependent yield stress - *Maëlle Labeille, LJK, CNRS, Université Grenoble Alpes*~~
17:55 - 18:10	*Questions & Discussion*
19:30 - 22:00	***Gala dinner (Brasserie du Corum)***

Wednesday, November 19th, 2025

	Session W1 - *Chairman: Olivier Millet*
09:00 - 09:40	**Sediment transport, ripples and dunes: state of the art and open problems -** *Bruno Andreotti, LPENS, CNRS, ENS, Sorbonne Université, Université Paris Cité*
09:40 - 09:55	Effects of particle shape variability on the microstructure of granular materials - *Duc-Cuong Pham, LMGC, CNRS, Université de Montpellier*
09:55 - 10:10	A macroscopic comminution model for the grinding of unsaturated granular media - *Mathis Thouret, IATE, INRAE Montpellier*
10:10 - 10:25	Capillary-driven complexity: Phase transitions and poromechanics in disordered granular systems - *Katerina Ioannidou, LMGC, CNRS, Université de Montpellier*
10:25 - 10:40	*Questions & Discussion*
10:40 - 11:10	***Coffee break***
	Session W2 - *Chairman: Didier Georges*
11:10 - 11:50	**Capillarity modeling -** *Olivier Millet, LaSIE, CNRS, La Rochelle Université*
11:50 - 12:05	DEM Simulation of 3D fresh and degraded ballast grain model reconstructed by K-means algorithm and morphology analysis - *Jitinun Prommarin, LMGC, CNRS, Université de Montpellier*
12:05 - 12:20	Packing behavior of non-convex cohesionless granular media - *Auwal Alhassan Musa, LMGC, CNRS, Université de Montpellier*
12:20 - 12:35	Intermittent clogging of non cohesive suspension flows - *Mathieu Souzy*, *RECOVER, INRAE, Aix-Marseille Université*
12:35 - 12:50	*Questions & Discussion*
12:50 - 13:00	***Closing session***
13:00 - 14:00	***Lunch***