

Postdoctoral Position in Physics of granular matter in contact with elastic walls

Contact

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Keywords

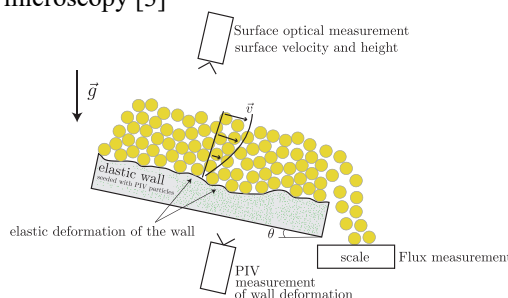
Granular mechanics, Elasticity, Interfaces, Experimental physics.

Context

Granular flows are found in nature (landslides) and industrial applications (3D printing of powders). Research over the last 30 years has led to the development of volume rheological rules and physical understanding of the flow of granular materials. Beyond rheological volume laws, the role of the walls over which the granular material flows is crucial for confined systems, as interactions between the wall and the granular material set the boundary conditions of the velocity field, modify the local structure and can even affect volume properties. Recently, a new type of interaction has been investigated: the interactions between rigid particles and an elastic wall. Rich phenomenologies have been discovered (hydro-elastic repulsion and effective viscosity reduction [1]). Existing studies only concern single rigid particles and dilute suspensions (numerical studies). The aim of this project, is to experimentally investigate the role of wall elasticity on the rheology of dense granular materials in a model experiment.

Mission

The postdoctoral researcher will conduct controlled experiments on a model granular system in contact with elastic walls. The project will explore how the stability and rheology are modified by the deformability of the wall. The experimental program may include flow configurations such as avalanches on incline plane or gravitational discharge of a silo [2]. This experimental work will be complemented by measurement of local deformation of the elastic wall by a boundary force microscopy [3]



Profile

We are seeking highly motivated candidates with a PhD in Soft Matter Physics, Fluid Mechanics, or Solid Mechanics, and a strong interest in experimental research. A substantial part of the project will involve the processing and analysis of experimental images.

Environment

The work will be carried out at the FAST laboratory within the Granular and Suspension team, under the supervision of Hugo Perrin. FAST is a fluid mechanics laboratory jointly operated by CNRS and Université Paris-Saclay, located south of Paris (<https://www.fast.universite-paris-saclay.fr/>). In parallel the project can be carried out at the IUSTI laboratory within the SOFT team, under the supervision of Hugo Perrin and Pierre Jop. IUSTI is a mechanics laboratory jointly operated by CNRS and Université Aix-Marseille, located in Marseille.

Conditions

The anticipated start date is Winter 2026, with flexibility to accommodate the successful candidate's availability. The appointment will be for a two-years term. Applications should be submitted by **October 01, 2026**, and interviews are expected to take place in January 2026.

Application procedure on <https://emploi.cnrs.fr/Offres/CDD/UMR7608-HUGPER-002/Default.aspx>

Interested candidates are invited to contact Hugo Perrin with a detailed CV, a cover letter outlining their motivation and relevant research experience (maximum one page), digital copies of their Master's and Ph.D. degree certificates, as well as the names and contact details of two or three referees. Informal enquiries are welcome.

[1] Marco Edoardo Rosti, Mehdi Niazi Ardekani, and Luca Brandt. Effect of elastic walls on suspension flow. *Phys. Rev. Fluids*, 4:062301, Jun 2019.

[2] Clogging transition of many-particle systems flowing through bottlenecks. *Scientific Reports*, 4(1):7324, 2014.

[3] R. W. Style. Traction force microscopy in physics and biology. *Soft Matter*, 10:4047–4055, 2014.