UCSB

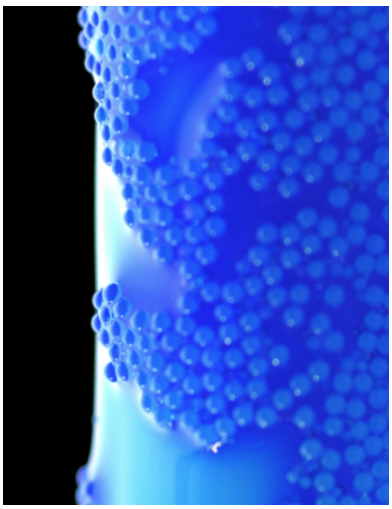
M&M Flow Lab
Multiphase & Multiscale

Internship Proposal

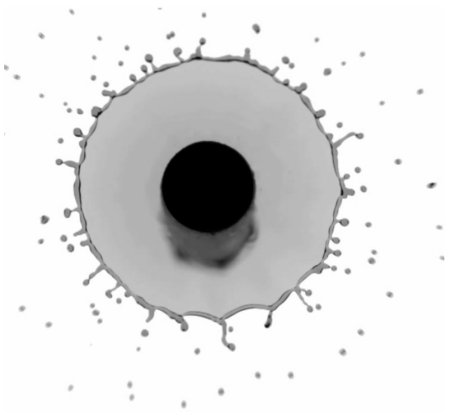
Suspension of particles in confined environment

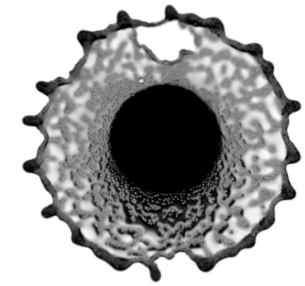
University of California, Santa Barbara (USA)

Contact: Alban Sauret
asauret@ucsb.edu
https://engineering.ucsb.edu/~asauret/



Suspension flows are key to various industrial, environmental, and biological systems. A main issue for transport arises from the confinement of the particles. For example, in liquid films, the thickness of the liquid layer becomes comparable to the particle size. As a result, the particles deform the liquid interface, which leads to capillary effects, modifying the transport of particles and the overall dynamics. The capillary force contributes to the deposition of non-Brownian particles, as shown in the figure on the right, leading to the contamination of the surface and the loss of transported material. The interplay between particles and interfaces remains poorly understood. Our group is characterizing this dynamics to develop new coating processes.





It is also important to develop a new modeling of particulate suspension in confined environments to improve surface modification and treatment. For instance, sprays containing particles lead to the formation of different droplet size that can significantly decrease its efficiency (figure on the left). Such a situation is also critical to model the transport of contaminant in porous media, for oil recovery and for microfluidic applications involving biological particles.

We propose to investigate experimentally different physical situations in which capillary effects induced by particles contribute to the liquid film and thread dynamics. The results will be modeled by taking into account the influence of the liquid, the capillary forces, and the drag forces exerted on the particles. This knowledge will contribute to the optimization of industrial processes and reduce surface contamination.

The internship will be carried out in the Mechanical Engineering department at the University of California at Santa Barbara (USA). The ideal applicant will have a strong taste for experimental studies and modeling. For more information, feel free to contact A. Sauret (asauret@ucsb.edu).