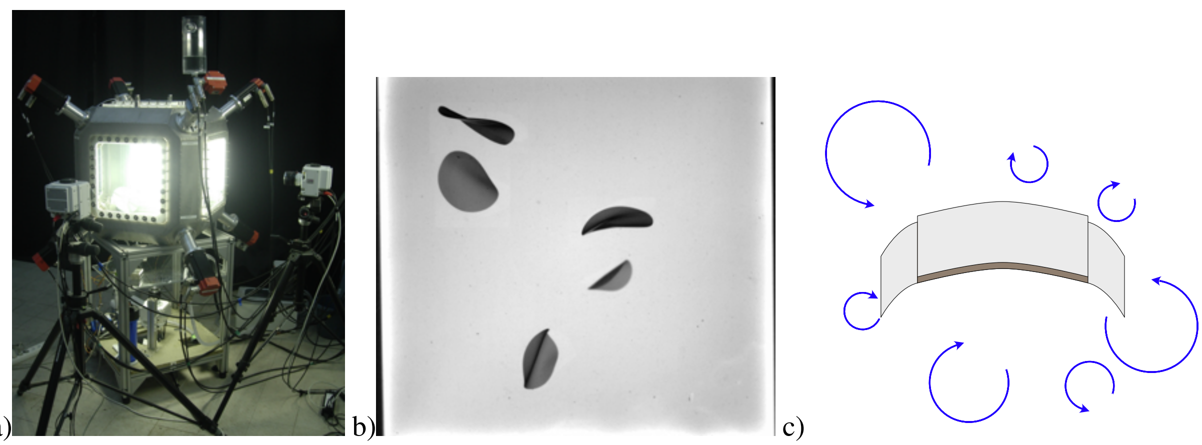
Deformation of inhomogeneous flexible particle in turbulence

These past years more and more studies have been devoted to the transport of flexible particles in turbulent flows. At IRPHE, we were pioneer in this work and characterize the deformations of homogeneous flexible fibers and discs [1,2,3]. These studies were both motivated by fundamental questions and applied ones going from the paper industry to the transport and the fragmentation of plastic litters in the ocean. This internship is in the continuity of this past work. Until now, only homogeneous particles, *i.e.* fibers with constant diameter or discs with constant thickness, have been considered. We want here to extend our previous work to the deformation of disc having a non homogeneous thickness. This question arises from the production of graphene where some process used high pressurized flow to exfoliate the graphene sheet from the graphite particles. Two mechanisms can be at play here : the shear stress which will peel the sheet and the bending of the graphite particles [4].

During this internship, we will investigate this last scenario with a model experiments where the graphite particles will be modelled by silicone sheet as this material allows to vary the thickness at wish. The goal here will be to measure the deformations, using three high speed cameras and an in-house numerical code [5]. The modelling of the deformation will based on our recent results of homogeneous and flexible discs.

The internship will take place at IRPHE, Marseille, and last at least 8 weeks. The recruited intern will be in charge of running the experiments, acquiring and analysing the experimental data and will participate to the modelling of the phenomenon. This project will be done in collaboration with C. Kamal (University College London).



a) b) c)

FIGURE 1 – a) Image of the experimental setup. b) Deformation of flexible homogeneous disc, from [3]. c) A sketch of expected deformation : the curvature of the disc at his highest thickness is smaller than where the disc is thinner. The contact line will concentrate some stress which might be the source of the exfoliation.

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Bibliography

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