Flow of suspension: from transport to clog

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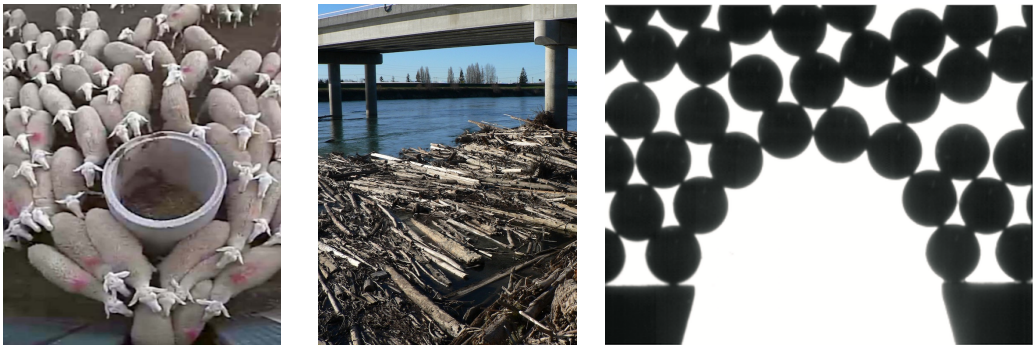
Flowing particles are present in many everyday life situations as well as in industrial, biological and geophysical processes. When a channel becomes suddenly smaller, particles can form arches. This results in the clog formation that have dramatic consequences for the transport of particles as shown in Fig. 1(a)-(c) with sheep, floating pieces of wood and glass beads, respectively. Predicting the complex dynamics associated with the clogging is thus of great interest for technological fields ranging from water purification to biomedical devices. To describe such processes, a good understanding of the coupling between particles, fluid flow and boundaries is necessary. In most systems, this coupling is not trivial as geometrical features, fluid dynamics, and particle interactions determine the behavior of interest.



(a) (b) (c)

Figure 1: Example of clogging of "particles". (a) Sheep passing a door (Garcimartín *et al.*, 2011). (b) Log jams at a bridge with a pier. (c) Grains forming an arch at a constriction (Janda *et al.*, 2008).

The aim of this internship is to study such coupling experimentally by considering the flow of a model suspension in a channel presenting a constriction. The intern will track the position and the trajectory of the particles. The tracking will lead to a prediction of the clogging events, depending on the geometry of the system, the concentration of particles, their properties, the flow rate, etc. A comparison with the dynamics of silo will be performed to highlight the analogy and difference with the classical situation.

The ideal candidate will have a background in physics and fluid dynamics as well as a taste for experimental work and data analysis. This internship will take place in the joint CNRS/Saint-Gobain Research laboratory (SVI) at Aubervilliers and/or at FAST Laboratory in Orsay.