Abstract Submitted
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Reconfiguration of a flexible fiber immersed in a 2D dense granular flow close to the jamming transition EVELYNE KOLB[1], NICOLAS ALGARRA, DAMIEN VANDEMBROUCQ, PMMH, ESPCI, ARNAUD LAZARUS[2], IJLRA, UPMC — We propose a new fluid/structure interaction in the unusual case of a dense granular medium flowing against an elastic fibre acting as a flexible intruder. We experimentally studied the deflection of a mylar flexible beam clamped at one side, the other free side facing a 2D granular flow in a horizontal cell moving at a constant velocity. We investigated the reconfiguration of the fibre as a function of the fibre's rigidity and of the granular packing fraction close but below the jamming in 2D. Imposing the fibre geometry like its length or thickness sets the critical buckling force the fibre is able to resist if it was not supported by lateral grains, while increasing the granular packing fraction might laterally consolidate the fibre and prevent it from buckling. But on the other side, the approach to jamming transition by increasing the granular packing fraction will be characterized by a dramatically increasing size of the cluster of connected grains forming a solid block acting against the fibre, which might promote the fibre's deflection. Thus, we investigated the granular flow fields, the fibre's deflexion as well as the forces experienced by the fibre and compared them with theoretical predictions from elastica for different loadings along the fibre.

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