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10 rue Vauquelin, 75231 Paris Cedex 05



Séminaire PMMH

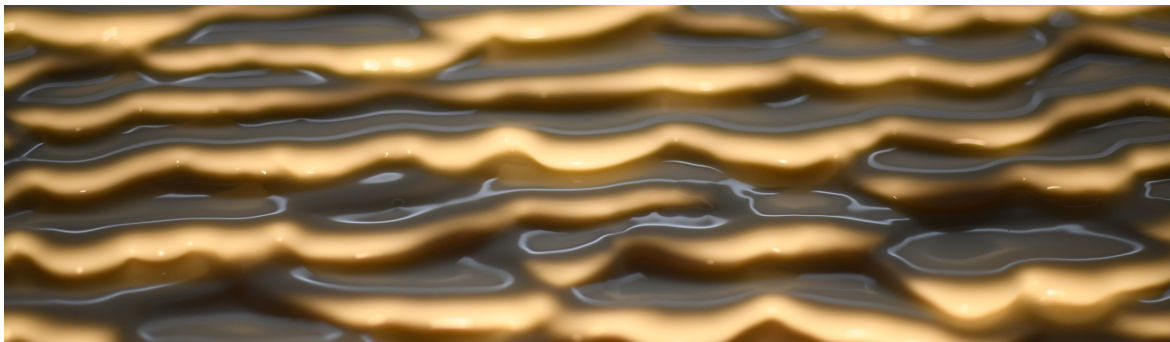
Vendredi 22 janvier 2021, 11h00-12h00

Baptiste Darbois-Textier

FAST - Université Paris-Saclay

Surface instability of shear-thickening suspensions down an inclined plane

A shear-thickening suspension, such as cornstarch particles in water, exhibits a very strange behavior : it flows as milk when gently stirred but turns rock solid under impact. Despite its notoriety, this phenomenon has been understood only recently. Based on this progress, we decided to explore the behavior of shear-thickening suspensions in hydrodynamical configurations and more specifically on an inclined plane. When a concentrated suspension of cornstarch flows down an incline, you can observe very prominent waves developing at the free-surface (see picture). Intrigued by those waves, we measure systematically their onset of apparition and their characteristics. These measurements first reveal that, at low packing fractions, the destabilization corresponds to a Kapitza instability that is well-established for Newtonian fluids. The main surprise here is that at high packing fractions, a new instability emerges at Reynolds numbers much smaller than the Kapitza threshold. I will explain how the recent framework developed to model shear-thickening allows to rationalize this new instability, focusing particularly on the apparition of S-shape flow curves at high packing fractions. Finally, I will propose a generic mechanism for this destabilization that occurs at low inertia and I will discuss its extension beyond the particular case of cornstarch suspension.



Prochain séminaire : vendredi 29 janvier 2021, Joseph Tavaoli (LMU, München)

Programme des séminaires : www.pmmh.espci.fr, onglet *Séminaires PMMH*

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