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Mechanism of air entrainment by an oblique jet

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Air entrainment is a process in which gas is incorporated into a bath of liquid. It can be observed at various scales, from breaking waves to the pouring of a glass of water. In both situations, the liquid meets the bath at an angle. In this talk, we will present a study of the mechanism of air entrainment by an oblique capillary jet impacting a bath of water. We will begin by describing the shape of the interface formed by this jet. Through a combined experimental and computational study, we will show that the angle between the jet and the bath introduces an asymmetry that is responsible for the formation of a cavity in front of the jet. A Kelvin-Helmholtz instability on the side of this cavity generates perturbations that can lead to the pinch-off of bubbles. Finally, we will discuss the effect of surface-active impurities on this phenomenon.

Auteurs: Prof. SALONEN, Anniina (SIMM); Prof. ANTKOWIAK, Arnaud (Institut Jean le rond D'alembert); Prof. RIO, Emmanuelle (LPS); GAICHIES, Théophile (LPS)

Orateur: GAICHIES, Théophile (LPS)

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