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Multiphase plumes in a rotating environment DARIA FRANK, University of Cambridge, JULIEN LANDEL, University of Manchester, STUART DALZIEL, PAUL LINDEN, University of Cambridge — The Deepwater Horizon (DwH) blowout in 2010 resulted in a formation of a multiphase plume consisting of oil droplets and gas bubbles. The multiphase component of a plume is commonly characterised by the so-called slip velocity. Additionally, the duration of the DwH spill of several months implies that the plume is likely to have been affected by the Earth's rotation as was conjectured by previous numerical and experimental studies. The complex interplay between the slip velocity of the multiphase effluent and the system rotation as well as their combined effects on the internal plume dynamics and the associated subsurface dispersion of pollutants are still poorly understood. Yet, characterising these effects is important for oil spill mitigation purposes. In this talk, we present results from small-scale laboratory experiments on bubble plumes released into a rotating environment that were conducted for a wide range of Rossby numbers and several bubble slip velocities. By performing a rigorous image analysis, we focus on three particular aspects of the problem: the evolution of the plume structure during its initial rise, the subsurface dispersion of the effluent once the plume has risen through the entire water column and the lateral spreading of the plume on the water surface.

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