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Particle-wall impacts in a confined extensional flow DANIELE VIGOLO, Princeton University, IAN GRIFFITHS, ANTHONY LOCK, University of Oxford, HOWARD STONE, Princeton University — Buoyant particles entrained in liquid flowing in confined geometries such as pipes and channels arise in a broad spectrum of areas including engineering and the natural and biological sciences. Understanding the particle behavior upon changes in flow direction is crucial in problems where particle inertia is important, such as the erosion process in pipe bends. We present results on the impact of particles in a T-shaped channel in the laminar-turbulent transitional regime. The impacting event for a given system regime is described in terms of the particle Stokes number and the Reynolds number, where for the model local extensional flow the latter also characterizes the ratio of particle size to thickness of the viscous boundary layer which forms in the region below the impingement. Experimental results for the impact are compared with the trajectories predicted by theoretical particle-tracing models for a range of configurations to determine the role of the viscous boundary layer in slowing down the particles and reducing the rate of collision with the substrate. The implications of our results on the erosion process in a piping system are discussed.

Daniele Vigolo
Princeton University

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