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**Particle collision in Newtonian and viscoelastic fluids** AREZOO ARDEKANI, MIT — Particle-particle and particle-wall collision occurs in many natural and industrial applications such as sedimentation, crystal growth, suspension rheology, and microfluidic devices such as those used in mechanical cell lysis. To accurately predict the behavior of particulate flows, fundamental knowledge of the mechanisms of single collision is required. In this work, particle-wall collision in Newtonian and viscoelastic fluids is numerically and experimentally studied. The effect of Stokes number, surface roughness, and Deborah number on the rebound velocity of a colliding spherical particle on a wall is considered. The experimental study of particle-wall collision in poly(ethylene-oxide) mixed with water shows that the results for the coefficient of restitution in polymeric liquids can be collapsed together with the Newtonian fluid behavior if one defines the Stokes number based on the local strain rate. In addition, the effects of particle interaction and collision on the droplet breakup in a particulate shear flow are studied. The presence of particles leads to larger droplet deformation and a perforation in the center of the droplet. It is found that the critical Stokes number above which a perforation occurs increases linearly with the inverse of the capillary number and viscosity ratio.

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