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Simulation of particle sedimentation in the interface of a stretched capillary bridge LORENZO BOTTO, School of Engineering and Materials Science, Queen Mary University of London — This talk examines the classical problem of particle sedimentation. In contrast to traditional studies focusing on bulk suspensions, we consider particles entrapped in nearly vertical fluid interfaces and sedimenting owing to gravity or a magnetic field. The interface shape corresponds to that of an axi-symmetric capillary bridge held captive between two parallel circular disks. A transport equation for the particle concentration field has been developed and coupled to the Navier-Stokes equation for the fluid; the resulting system solved numerically in the thin-thread approximation for small capillary and Reynolds numbers. The lower disk is stationary and the upper disk moves with an assigned velocity. The ratio of the settling to stretching velocities is varied. The competition between the sedimentation-induced particle flux and the extensional flow in the neck leads, for intermediate settling velocities, to the formation of a "ring" of high particle concentration; for sufficiently large settling velocities, the particles settle at the bottom of the bridge, potentially modifying the interface shape. These results may help understand the effect of body forces on interfacial tranport, with application to froth flotation processes and the stability of Pickering emulsions.

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