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Viscous erosion at low Reynolds number WILLIAM MITCHELL, SAVERIO SPAGNOLIE, University of Wisconsin - Madison — We study the shape evolution of immersed particles in a viscous fluid under several flow configurations, including uniform background flows and shear flows in wall-bounded or free domains. The surface recedes proportionally to local shear stress, which we compute using a new traction integral formulation of Newtonian Stokes flow. This opens the door to efficient numerical simulation of the evolving particle geometry. Analytical predictions from reduced-order models are then compared against the numerical simulations. For the case of particles held fixed against an oncoming background flow, the theory predicts the finite time required for complete particle dissolution as well as the emergence and locations of sharp corners on the eroding bodies. Simulations involving force- and torque-free particles and multibody systems are also presented.

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