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The effect of surface deformation on droplet collisions PAUL VAN NOORDT, CARLOS HIDROVO, University of Texas at Austin — Microfluidics has proven to be of great value in many engineering and scientific applications. Because of the small scales involved, microfluidics requires only small sample sizes, which can result in shorter reaction and analysis times, relatively cheap costs, and little waste. The present study will investigate the coalescence of two liquid droplets with the ultimate goal of applying the results to the design of a pneumatic-based impact-coalescence mixing microreactor. When two droplets collide, several outcomes are possible, namely bouncing, coalescence, disruption, and fragmentation. The outcome is influenced by several parameters, including the impact parameter, the droplet-size ratio, and the film thickness between the droplets. We will consider the transfer of energy via viscous dissipation from the high-speed droplets to the deforming surfaces. We examine the relationship between the kinetic energy and the surface energy of the droplets as they collide as a governing factor affecting the outcome of the collisions. By considering various conditions, a preliminary criterion has been established for each possible outcome.

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