Fragmentation Versus Cohesion
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Capillarity is the familiar manifestation of the cohesion of liquids. Since Laplace (1805), we know that intense attractive forces between the molecules bridge the small with the large as they shape liquid/vapor interfaces at the macroscopic scale through the concept of surface tension (menisci, drops, bubbles, puddles, liquid rise in tubes, etc…). We concentrate on situations where liquids `disgregate', following the neologism of R. Clausius (1862), meaning that they fragment by the action of deformations stresses whose intensity competes with that of cohesion forces. Various examples, including explosions, blow-ups, hard and soft impacts, and shears applied to liquid jets, sheets and drops are reviewed. They concern applications ranging from liquid propulsion, agricultural spraying, to the formation of ocean spray, raindrops, and human exhalations by violent respiratory events. In spite of their diversity, the various modes of fragments production share an ultimate common phenomenology --the ligament dynamics--, suggesting that the final stable droplets size distribution can be interpreted from elementary principles.