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Transient behavior of liquid drops with a polymerized interface DOMINIQUE BARTHES-BIESEL, PIERRE-YVES GIRES, ANNE LE GOFF, ERIC LECLERC, ANNE-VIRGINIE SALSAC, BMBI, Universite de Technologie de Compiegne, IFSB TEAM — Capsules consisting of a liquid droplet enclosed by a thin polymerized membrane are commonly encountered in nature or in industry. The mechanical properties of the capsule wall are essential to control particle integrity and release of the internal contents. We have designed a novel method to assess the elastic surface shear modulus Gs of micrometer size capsules. It is based on the comparison between the predictions of a numerical model and the experimental measurement of the steady velocity and deformed profile of a capsule flowing in a square section microfluidic tube. To assess membrane viscosity, we have designed a new set-up, where a capsule exits suddenly from a square channel into a wider rectangular channel. The technique is illustrated for initially spherical capsules with a thin cross-linked albumin (HSA) membrane. From the profile in the square channel, we infer the mean value of Gs. We then follow the transient deformation of the capsule in the rectangular pore. Under the same flow conditions, the experimental relaxation time is about twice the numerical time computed for a capsule with a purely elastic membrane. The HSA membrane has thus some viscosity, probably due to the rearrangement of loose HSA molecules on the inside of the membrane.

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