Abstract Submitted
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Numerical simulations of opto-hydrodynamics of fluid-fluid interfaces[1] HAMZA CHRAIBI, DIDIER LASSEUX, ERIC ARQUIS, TREFLE, REGIS WUNENBURGER, JEAN-PIERRE DELVILLE, CPMOH, TREFLE TEAM, CPMOH TEAM — Control of fluid-fluid interface deformation induced by the radiation pressure of a laser wave is of major concern for the development of numerous applications in microfluidics. Recent experimental work has shown that several deformation regimes can be identified and that, under certain conditions, hydrodynamic instability can occur leading to the formation of jets, drops and bridges. The purpose of the present work is to analyse the physics of deformation using direct numerical simulation of the hydrodynamics coupled to radiation. The configuration is that of a polarised and focused Gaussian laser beam impinging on an interface separating two immiscible viscous Newtonian liquids. A Boundary Integral Element Method was developed to solve the two-phase axisymmetric Stokes flow allowing a precise description of the interface shape and dynamics until final equilibrium is reached. Both linear and non-linear regimes are investigated and results are compared to experimental data as well as to the solution of the differential equation describing equilibrium. Strong non linear deformations are discussed.

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