Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Guiding original micrometric morphologies induced by optical and acoustical focused waves on liquid interfaces HUGO CHESNEAU, JULIEN PETIT, NICOLAS BERTIN, HAMZA CHRAIBI, ETIENNE BRASSELET, Laboratoire Ondes et Matiere d'Aquitaine, RÉGIS WUNENBURGER, Institut Jean le Rond d'Alembert, JEAN-PIERRE DELVILLE, Laboratoire Ondes et Matiere d'Aquitaine, UNIV. BORDEAUX, CNRS, LOMA COLLABORATION, UNIV. PIERRE ET MARIE CURIE, INSTITUT JEAN LE ROND D'ALEMBERT COLLABORATION — We present here a study about liquid waveguides which can adapt themselves continually to optical or acoustical wave properties. By exploiting the radiation pressure exerted by a wave, it is possible to deform a two-phase liquid interface and create a liquid waveguide which can also play the role of a microfluidic flow channel. The incident wave can induce two kinds of morphologies depending whether the phase velocity of the wave decreases or increases when crossing the interface; the latter will either adopt a step-like or a needle profile. The aim of this investigation is to study numerically the coupling between propagation of the wave and deformation of the interface. Two assumptions are put forward and compared to experimental and theoretical results: In the one hand, step-like interfaces behave as stacks of cylindrical waveguides and in the other hand needle interfaces are induced by a total internal reflection of the incident wave into the deformation. These results could serve as a basis to develop versatile and adaptable microfluidic waveguides and flow channels.

Hugo Chesneau
Laboratoire Ondes et Matiere d'Aquitaine

Date submitted: 27 Jul 2017 Electronic form version 1.4