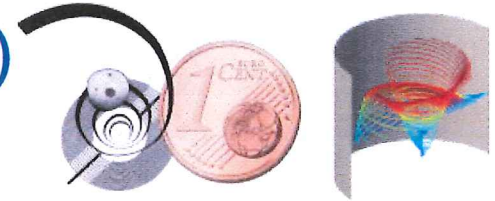
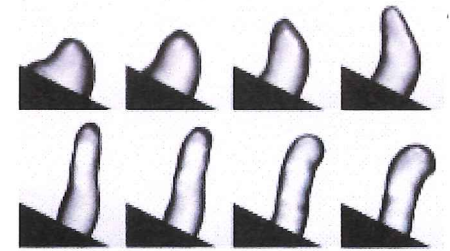


# 20<sup>th</sup> I<sup>2</sup>plus Seminar

Schedule: 14:00 ~, Dec. 13<sup>th</sup> 2016

Place: ME Meeting Room (2F, Bldg #2)

Speaker: Prof. M. Baudoin (Univ. Lille 1, France)



## Surface acoustic waves: a versatile toolbox for fluids and particles manipulation at milli- and micro-metric scales

**Abstract:** Surface acoustic waves (SAWs) are mechanical vibrations propagating at the surface of solid substrates. At MHz frequency, these vibrations are very efficiently transmitted to a fluid in contact with the substrate and hence can be used for fluid manipulation at milli- and micro-metric scales through the use of two nonlinear effects: the acoustic radiation pressure and the acoustic streaming. The first effect is a force, which appears when a wave is scattered by an interface between two media with different propagation speed and/or densities. The second is a flow resulting from the attenuation of the acoustic wave and the transmission of pseudo-momentum from the wave to the fluid.

It has been shown in the last decade that surface acoustic waves can be used to displace, divide, merge and atomize sessile droplets, create active slippery surfaces but also actuate fluids embedded in micro-channels. Nevertheless, all these operations require a specific design of the wave generation system, the so-called interdigitated transducers (IDT), which are equally spaced electrodes sputtered at the surface of a piezoelectric substrate, and which are used for the wave synthesis.

In this presentation, we will first review some of the possibilities offered by SAWs for microfluidics. Then we will show that it is possible to perform all the aforementioned operations with a single system by using inverse filter technique and IDTs arrays instead of single transducers. Finally, we will explore the possibilities offered by a new type of helical SAWs, called swirling SAWs for selective 3D micro-particles trapping and vorticity control at micrometric scales.



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