MS4I_12960

XXI International Congress of Theoretical and Applied Mechanics
Warsaw, Poland, August 15–21, 2004

Slip, Patterns, and Other Small Things in Microfluidic Systems

Patrick Tabeling

École Normale Supérieure, Paris, France

Microfluidics is about flow of liquids and gases, through microdevices fabricated by MEMS (i.e. Micro ElectroMechanical Systems) technology, using hard (silicon or glass) or soft (polymers) materials. The domain is fostered by exciting applications, representing important industrial challenges. It also embraces a number of fundamental issues, interesting in their own right. The introductory talk will concentrate on some of them, through a presentation of a number of experiments we have been carrying out at ESPCI, over the last three years. I will discuss the controversial topics of slip between liquid and solid, and the less controversial phenomenon of slip of gas in microchannels. Mixing is difficult in microsystems, and this has been a source of motivation for studying chaotic micro-mixers. I will present an experimental study of chaotic micromixing, which led to observe a novel resonance phenomenon. I will finally present studies on two-phase flows in microsystems, which led to produce rich, and potentially interesting, patterns. In many cases, microfluidics offers a context for the observation of unexpected behaviors of fluid systems, often inspiring novel engineering concepts.

View the extended summary