

Abstract Submitted
for the DFD05 Meeting of
The American Physical Society

Arnold tongues in a microfluidic drop emitter. HERVE WILLAIME, VALESSA BARBIER, PATRICK TABELING, ESPCI CNRS, Laboratoire de Microfluidique, MEMS et Nanostructures, Paris, France — In this paper, we present experimental study of microfluidic droplets produced in T junctions and subjected to local periodic forcing. Droplets of water are generated periodically in the main channel. The emission frequency depends mainly on both oil and water flow rates. External forcing allows the control of the emission of droplet. Synchronized and quasiperiodic regimes – structured into Arnold tongues and devil staircases – are reported. The nature of the dynamical regime controls the droplets characteristic. Depending on the flow conditions, one may either favor synchronized regimes giving rise to mono-disperse emulsions of controlled size or promote quasi-periodic regimes giving rise to polydisperse emulsion. The width of each regime is affected by the characteristics of the unforced regime and also by the strength of the external forcing.

Herve Willaime
ESPCI CNRS, Laboratoire de Microfluidique
MEMS et Nanostructures, Paris, France

Date submitted: 29 Jul 2005

Electronic form version 1.4