Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

Frozen Fronts selection in flow against self-sustained chemical waves THIBAUD CHEVALIER, CNRS, DOMINIQUE SALIN, UPMC, LAURENT TALON, CNRS — Laboratoire Fluides Automatique et Systèmes Thermiques, Université Paris Sud, C.N.R.S. (UMR7608), Bâtiment 502, Campus Universitaire, 91405 Orsay Cedex, France Autocatalytic reaction fronts between two reacting species in the absence of fluid flow propagate as solitary waves. The coupling between autocatalytic reaction front and simple forced hydrodynamic flows may lead to stationary fronts whose velocity and shape depend on the underlying flow field. We focus on the issue of the chemo-hydrodynamic coupling between forced advection opposed to self-sustained chemical waves which can lead to Frozen Fronts, i.e. static stationary fronts, S. Saha et al, EPL 101, 38003 (2013). We perform experiments and numerical simulations with the well characterized autocatalytic Iodate Arsenous Acid reaction (IAA) over a wide range of flow velocities around a solid disk. We delineate the range over which we do observe these Frozen Fronts. We compare the shape of the observed Frozen Fronts to the computed ones in the so-called eikonal, thin front limit. In this limit, we are able to provide a scenario for the selection of the observed frozen states.

Dominique Salin
UPMC

Date submitted: 17 Jul 2015 Electronic form version 1.4