

The France-America partnership and  
NSF-PIRE announce

# LAB-BASED WORKSHOP ON THE DYNAMICS OF BUBBLES AND DROPS

University of Florida, June 20-24 2011



The University of Florida welcomes you to the 6<sup>th</sup> Partner University Fund (PUF) workshop\* on the dynamics of bubbles and drops. The main objective of this 6<sup>th</sup> workshop is to display basic knowledge of the physics of interfaces along with real time experiments and numerical simulations. The range of topics is expected to promote an exchange of ideas and knowledge between students and scientists working on contemporary issues of interfacial phenomena.

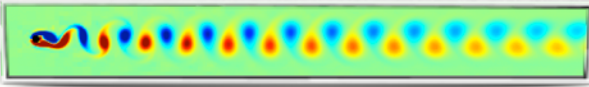
Participants are encouraged to bring their own laptops for the execution of the Gerris academic numerical code.

\* the five previous workshops took place in France (Paris, Poitiers, Marseille) and in U.S.A (Gainesville)



UNIVERSITY OF FLORIDA,  
Department of Chemical Engineering,  
FL 32611 Gainesville, USA.

Visit <http://www.che.ufl.edu/france-us-teams/>  
for hotel information after Feb 15 2011.



### Objectives

Solve real world fluid related problems like fuel injection in engines, oil extraction, inkjet printers, sprays, lab-on-chip for chemical reactions, DNA testing, etc. with applications to numerous industries such as automotive, aerospace, petroleum, pharmaceutical, etc.

### Topics

Interfacial flows, dynamics of contact line, singularities, flow dynamics in confined geometries (microfluidics), interfaces & vibrations

### Course format.

Laboratory format preceded by guiding lectures (real time experiments + initiation to numerical simulations with the academic flow solver Gerris)

### Audience

Research engineers and industrial scientists, students (graduate and PhD), post-doctoral associates.

### Pre-requisites

Basic knowledge in fluid dynamics

### Fees

Academics may participate without any fee (contact sakir.amiroudine@u-bordeaux1.fr or ranga@ufl.edu). 1500\$ fees charged for non-academics. PUF has limited grants for students from France (application before May 1<sup>st</sup> 2011 to gerard.labrosse@u-psud.fr)

### Instructors & organizers

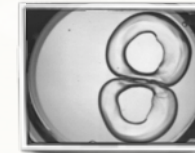
- Stéphane Popinet (NIWA/University of Paris 6)
- Michael Baudoin (University of Lille 1)
- Sakir Amiroudine (University of Bordeaux 1)
- Farzam Zoueshtiagh (University of Lille 1)

# LAB BASED WORKSHOP ON THE DYNAMICS OF BUBBLES AND DROPS

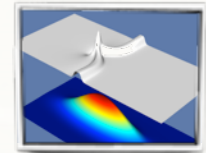
UNIVERSITY OF FLORIDA, JUNE 20-24 2011

## MONDAY 20<sup>TH</sup> OF JUNE

- 9:00 - 9:30 Welcome & Opening  
 9:30 - 12:00 Introduction to interfacial flows  
 14:00 - 15:30 Introduction to numerical methods for interfacial flows  
 15:30 - 17:00 Introduction to the numerical code Gerris



*Air bubbles deformed by vibrations*



*Small amplitude solitary wave interacting with a parabolic hump*

## TUESDAY 21<sup>TH</sup> OF JUNE

- 9:00 - 12:00 Interfaces and vibrations  
 Bubbles and the Rayleigh-Plesset equation  
 Droplet vibration : capillary inertial and viscous modes  
 14:00 - 17:00 Labs : case examples with Gerris



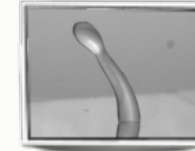
*a droplet impacting a micro-grid*



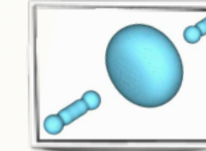
*Atomization of a pulsed liquid jet.*

## WEDNESDAY 22<sup>TH</sup> OF JUNE

- 9:00 - 12:00 Wetting and spreading  
 Contact line, hysteresis, electrowetting  
 14:00 - 17:00 Invited lecture : « the physics of dispersed multiphase flows » by Prof. S. Balachandar



*a droplet deformed by surface acoustic waves*



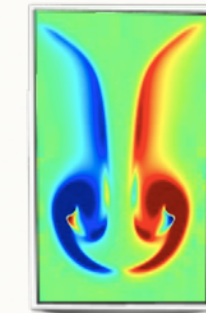
*Savart-Plateau-Rayleigh instability of a water column.*

## THURSDAY 23<sup>TH</sup> OF JUNE

- 9:00 - 12:00 Singularities, Plateau-Rayleigh instability, pinch-off, viscous self-similar solutions  
 14:00 - 17:00 Labs : case examples with Gerris



*droplet impacting a superhydrophobic surface*



*Rayleigh-Taylor instability*

## FRIDAY 24<sup>TH</sup> OF JUNE

- 9:00 - 12:00 Dynamics in confined geometries : motion of bubbles and plugs (Hoffman-Tanner and Bretherton laws)  
 14:00 - 17:00 Labs : case examples with Gerris