



UNIVERSITAT POLITÈCNICA
DE CATALUNYA
BARCELONATECH

Research Team name: Microgravity Laboratory,
Technical University of Catalonia-BarcelonaTech (Spain)

Presenter name: Ricard González-Cinca

Team Presentation – Annual Workshop, COST Action MP1106
Dublin, September, 2012



Team's general info

Research Team Name: UPC Microgravity Lab

Number of team members: 8

Brief description of team:

Team leader: Ricard González-Cinca, Physicist

- 2 post doctoral fellow
 - 1 Ph.D. student
 - 3 M.S. student
 - 1 undergraduate student
 - 1 technician
-
- ❖ 3 Aeronautical Engineers
 - ❖ 2 Physicists
 - ❖ 2 Mechanical Engineers
 - ❖ 1 Electrical Engineer



Relevance to MP1106

Research interests related to MP1106:

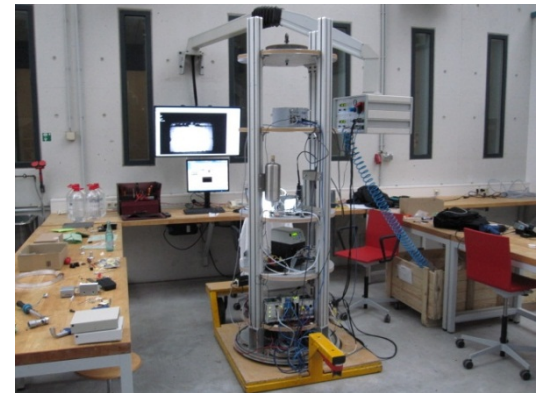
- Bubble/droplet injection
- Bubble/droplet jet collisions (bouncing, coalescence)
- Two-phase flow patterns in channels
- Acoustic vibrations in multiphase flows
- Bubble/droplet management at different gravity levels (microgravity, hypergravity)



Lab description

Basic facilities, equipment, devices, etc:

- Laboratories at the Aeronautical Engineering School in UPC campus in Castelldefels (Barcelona)
- Total surface: 75m² (labs) + individual offices
- Electronics and mechanical workshops
- Relevant equipment: high-speed cameras, high amplitude acoustic wave generator, CFD tools, etc.
- Payload building and integration in sounding rockets, parabolic flights, drop towers, etc.
- Use of NASA, ESA, ZARM and INTA facilities.





Projects

#1 project :

Title: Bubble generation in microgravity related conditions

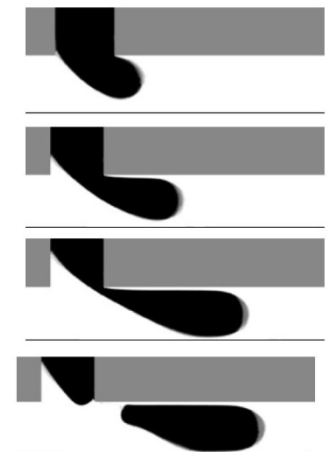
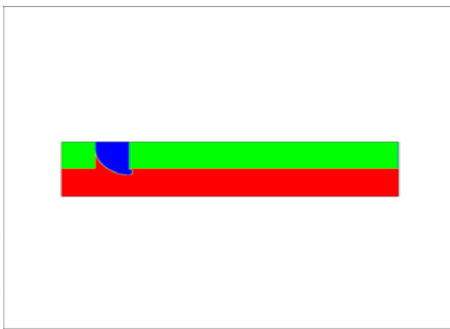
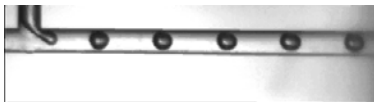
Duration: 4 yrs

Funding organization: Ministry of Science and Innovation (Spain)

People involved: 3

Facilities/equipment: lab, Jadim VoF numerical code (IMFT, Toulouse)

Most interesting results: experimental and numerical characterization of the performance of a T-junction bubble injector at different regimes: generation frequency and bubble size, flow patterns and flow transitions in microchannels.





Projects

#2 project :

Title: Bubble/droplet dispersion and collisions- bouncing and coalescence

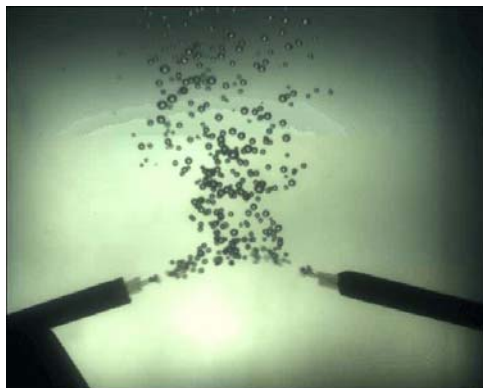
Duration: 4 yrs

Funding organization: Ministry of Science and Innovation (Spain), ESA

People involved: 2

Facilities/equipment: ESA parabolic flights, INTA and ZARM drop towers

Most interesting results: On ground and in microgravity: 1) Bubbles: jet dispersion, structure of two colliding jets, influence of impact angle and separation distance, coalescence, 2) Droplets: liquid jet breakup and atomization, coalescence.





Projects

#3 project :

Title: Bubble/droplet impact with a free surface

Duration: 3 yrs

Funding organization: Ministry of Science and Innovation (Spain), ESA

People involved: 3

Facilities/equipment: lab, ESA LDC

Most interesting results: 1) Bubbles: experimental and numerical analyses of the steady-rise zone and the impact zone, variations of bubble shape and dynamics (at different gravity levels) 2) Droplets: energy repartition between different phenomena (droplet bouncing, droplet ejection, jetting, splashing).





Projects

#4 project :

Title: Acoustic vibrations in multiphase flows

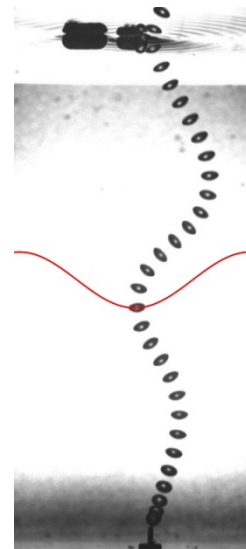
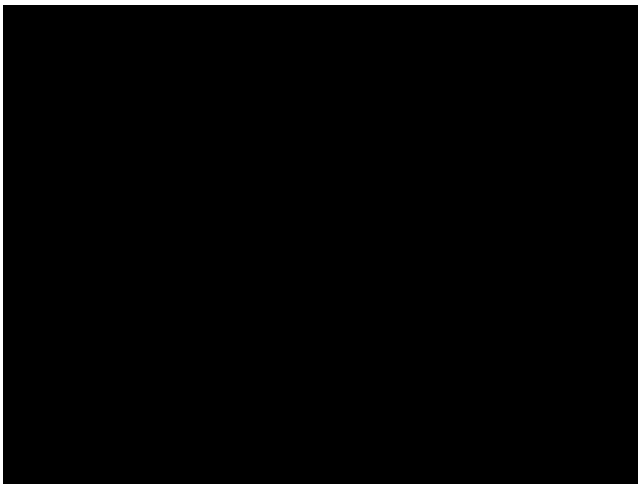
Duration: 2 yrs

Funding organization: Ministry of Science and Innovation (Spain), ESA, NASA

People involved: 4

Facilities/equipment: BEM code, ESA LDC, Suborbital reusable launch vehicles

Most interesting results: Exp.-Control of rising bubbles by means of acoustic waves, bubble trapping and oscillations, Num.-development of a BEM code.





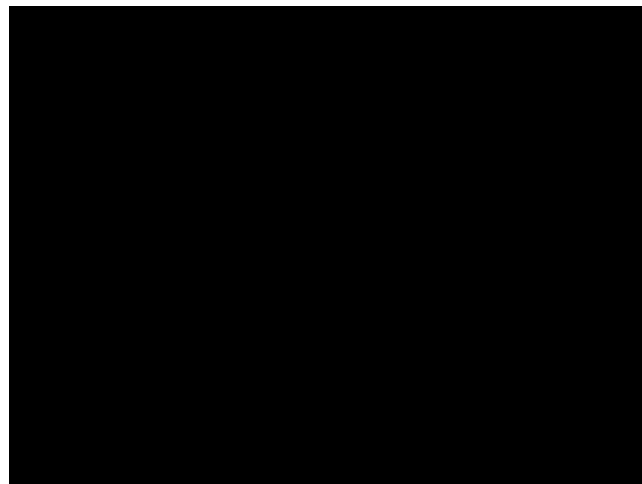
Topics for Research Proposal

#1 Topic

Title: Bubble management by means of external fields (acoustic, electric, etc)

Expertise required: Use of the considered fields

Facilities/equipment required: external fields generation equipment, numerical codes (VoF, BEM, ANSYS, etc)



Thank you for your attention