

PhD proposal

Analysis and modelling of the hydrodynamics of industrial bubble columns.

Duration: 3 years, starting September 2012.

Location: **IFP-Lyon** <http://www.ifpenergiesnouvelles.com/> at Solaize, France;
LEGI <http://www.legi.grenoble-inp.fr/> & **LGP2** <http://pagora.grenoble-inp.fr/recherche/> laboratories at Grenoble, France.

Candidate profile: Strong formation in fluid mechanics. Interest in experimentation and in modelling.

Topic: Bubble columns are widely used in industry for the transformation of matter, for recycling.... Yet, the modelling of such devices remains unsatisfactory due to the lack of reliable physical model describing the interactions between phases. So far, the exploitation of these systems relies on semi-empirical approaches based on experiments at different scales in order to adjust parameters such as bubble size, turbulent viscosity...

The goal is to improve our understanding of the hydrodynamics in such columns using combined measurements of various parameters such as void fraction, bubble sizes and velocities, carrier phase velocity... Experiments will be performed in columns of different sizes (typically from I.D. 100 mm up to I.D. 3000 mm), using aqueous as well as organic liquids in order to vary the coalescence efficiency. Measuring techniques are available (such as optical probes, endoscopic camera, Pavlov tube, hot film probes...) but some developments may be required.

The resulting data base will be used to derive physical models concerning in particular momentum exchanges between phases and bubble size distributions, with the objective to characterise the flow of the carrier phase (maximum velocity, turbulence intensity...) in industrial columns. These data will be exploited to improve an existing 1D model and also to test the predictive capabilities of 2D/3D numerical simulations currently under development at IFP.

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