Student practical training / Bachelor theses / Master theses / Compulsory internship

Topic: Experimental investigation of two phase (Liquid-Gas) flow regime within a porous frit bubble generator, and its influence on bubble size and gas fraction distribution in the downcomer.

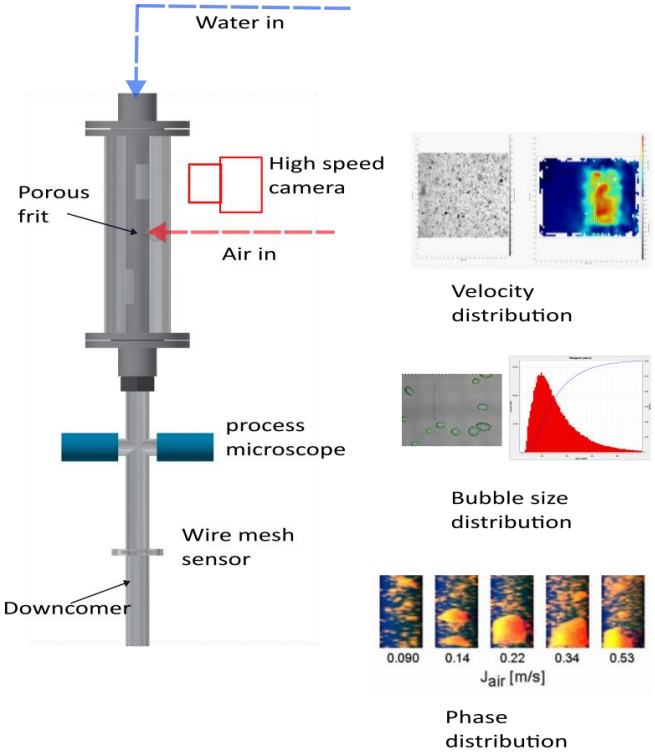

Fig: Experimental set up with probable results (Source HZDR)

Understanding of bubble generation mechanism and evaluation of bubble size is critical for any process (e.g. reaction in a bubble column, mineral flotation process etc.). The size of the bubbles and its flow regime in the column/reactor determines the hydrodynamics which influences the reaction kinetics or recovery of the minerals in a flotation cell. There are different methods to generate microbubbles, one of them using a porous frit (commonly used in the industries due to simple design and its robustness). Two-phase flow regimes (slug, plug, annular, bubbly etc.) are well investigated in vertical and horizontal tube/pipe configuration. This study is focused on a porous frit bubble generator with an aim to understand the regimes within the frit and its influence on the rest of the system.

Research question: Different flow regimes are observed in the frit at varying process conditions and the regimes influences the bubble size and the gas phase distribution in the downcomer.

Primary objectives of this study are:

1. Identifying the flow regime of the bubbles within the frit at varying process condition using the shadowgraphy technique,
2. Quantification of bubble size using a process microscope as it moves down the downcomer (vertical tube downstream of the frit) and,
3. Determine the gas fraction distribution using a wire mesh sensor.

Department: Transport processes at interfaces

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Requirements:
1. Field of study: chemical engineering, process engineering, fluid mechanics, physics or similar field of study,
2. High motivation for experimental research,
3. Understanding of fluid mechanics,
4. Working independently,
5. Matlab/Python and Image post processing will be an added advantage.

Conditions:
1.Working/Collaboration in an international team,
2. Will gain experience in sophisticated measurement techniques used in experimental fluid dynamics,
3. Duration: at least 6 months,
4. Location: TU Dresden.