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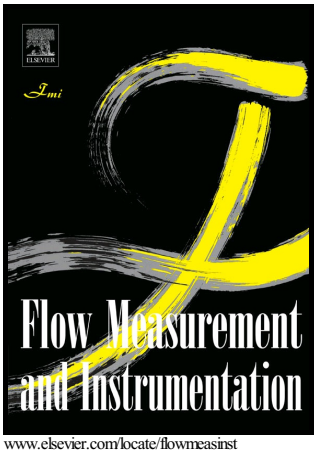

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Abstract:

The in-line image analysis of local bubble size distributions (BSD) in a bubble column with a diameter of 0.1 m and superficial gas velocities up to 2.1 cm/s is presented. The BSD is acquired via a telecentric shadowgraphic image analysis using a modified Optical Multimode Online Probe (OMOP). The column is operated in batch mode by using different alcohol/water mixtures aerated with compressed air, purged through a sintered glass plate (d_p=100-160 µm). At a total holdup up to 35%, the specific surface area is calculated out of the BSD by the optical method and compared to an empirical correlation.

Keywords: Bubble column; endoscopic measurement technique; multiphase flow; bubble size distribution

1. Introduction

Bubble columns are widely used in chemical industry for production of intermediates like terephtalic acid, acetic acid, oxo-alcohols, acetone, hydrogen peroxide or even of synthetic methane [1, 2]. They are usually non-agitated, which reduces investment costs and operated as e.g. as airlift loop reactor [3] or three phase slurry columns in Fischer-Tropsch-Synthesis [4], able to operate at high pressure and temperature. Nevertheless, the design of bubble columns is still a sophisticated procedure due to the complex hydrodynamics and its mutual dependency on chemical species transport (reactions and interfacial mass transfer). In a ‘rule of thumb’ basis design either the local flow phenomena at spargers, in dead zones, etc. are