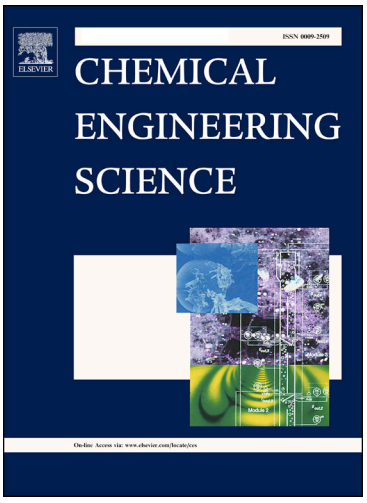


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# Mixing mechanisms in a low-sheared inhomogeneous bubble column

Elise Alméras[a,b,*], Cécile Plais[b], Véronique Roig[a], Frédéric Risso[a], Frédéric Augier[b]

[a] *Institut de Mécanique des Fluides de Toulouse (IMFT) - Université de Toulouse, CNRS,INPT,UPS, Toulouse France*
[b] *IFP Energies nouvelles, Rond-point de l'échangeur de Solaize, BP 3, 69360 Solaize, France*

**Abstract**

This paper reports an experimental study of the mixing of a passive scalar in a bubble column at high Reynolds number and average gas volume fractions ranging from 2.0% to 7.5%. Starting from a homogeneous bubble column, the bubbly flow is progressively destabilized by imposing a gradient of gas volume fraction at the bottom of the tank. In that way, a single recirculation is produced, which allows to investigate the impact of a large-scale buoyancy-driven flow on the mixing of a passive scalar. It is shown that, as long as the shear-induced turbulence generated by the recirculation is negligible, mixing results from two main mixing mechanisms: the transport by the mean liquid velocity and the mixing induced by the bubbles. While the transport by the liquid recirculation can be accounted for by an advection term, the mixing induced by the bubbles is a diffusive process, the effective diffusivity of which has been measured in a homogeneous bubble column by [3] Alméras et al. 2015. However, once the shear-induced turbulence produced by the shear develops, its role upon the mixing has to be taken into account too.

*Keywords:* Bubble column, Mixing, Bubble-induced agitation, buoyancy-driven flow

*Corresponding author
*Email address:* elise.almeras@ensiacet.fr (Elise Alméras )