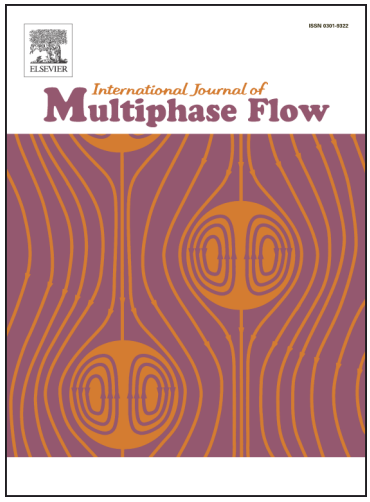

Rising behaviour of single bubbles in narrow rectangular channels in Newtonian and non-Newtonian liquids

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Rising behaviour of single bubbles in narrow rectangular channels in Newtonian and non-Newtonian liquids

Abbreviated title:

Bubbles rising in a confined geometry

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Abstract:

A phenomenological investigation of single bubbles ascending in a confined geometry with a rectangular cross section was done. Motivated by the goal to get a deeper understanding of the bubble behaviour in flat sheet membrane modules used in membrane bioreactors, the parameters channel depth (=spacing, 5-7 mm), bubble size (3-9 mm), superimposed liquid velocity (0-23.5 cm/s) and rheology of the continuous phase (Newtonian, shear-thinning) were varied. The shear-thinning liquid was used to simulate the rheological behaviour of activated sludge apparent in membrane bioreactors. The analysed properties included the rising paths, bubble shape, absolute and relative terminal rise velocities, friction factors and oscillation frequencies and amplitudes of the bubble.

As expected, a significant influence of the rheology of the continuous phase was found on the rising behaviour. In the shear-thinning liquid, the bubbles followed mostly a straight rising path with negligible oscillations. The variation of the channel depth mainly had an influence on the terminal rise velocity of