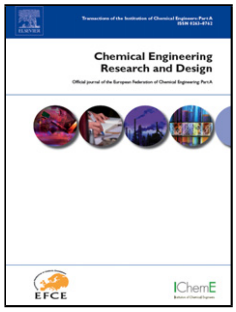

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On the effect of the Froude number on the interface area of gravity-driven liquid rivulets

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Abstract

The morphology of gravity-driven rivulets affects the mass transfer performance in gas separation processes, hence, the need for an improved knowledge on the hydrodynamics of this flow. It is well established that the interface area of the rivulets is determined by the balance between inertia and surface tension, i.e. the Weber number, which in light of the results presented here, are not the only parameters involved, but also the inclination of the plate has an effect on the balance of forces which determines the amount of gas-liquid interface area. The analysis of the interface area in rivulet flow demands, therefore, a more complete physical explanation for packing design purposes. In this work, we analyse the combined effect of both the inertia and the inclination of the plate in the interface area of liquid rivulets using CFD and the Volume-of-Fluid interface tracking method. As a result, we propose the use of the Froude number to provide a more complete physical explanation on the interface area formation of gravity-driven liquid rivulets.

Keywords: gravity-driven rivulet; interface area; gas separation; Froude number; CFD

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