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Computational study of liquid-gas cross-flow within structured packing cells[1] GIANLUCA LAVALLE, MATHIEU LUCQUIAUD, PRASHANT VALLURI, The University of Edinburgh — Absorption columns used in the carbon capture processes and filled with structured packings are crucial to foster the exchanges and the transfers between the absorber liquid and the flue gas. However, flow reversal can occur under special flow conditions, resulting in a dramatic drop of the technological performances. We investigate numerically the liquid-gas pattern within a cross-flow packing cell. The cell is a complex geometry with two connected channels, where the two phases flow co- or counter-currently. We show that an increase of both the gas speed and the liquid load leads to an increase of the pressure drop. Particular focus is also given to the analysis of flow repartition and flooding delay. We reveal that tilting the unit cell helps to delay the flooding and extends the operational capability. The pressure drop of the cross-flow unit cell is also compared to the Mellapak packing which is widely used in carbon capture applications. Finally, we support this study by performing numerical simulations on simpler geometries by means of a low-dimensional film-gas model, in order to investigate the two-phase dynamics and predict the flooding onset with a low computational cost.

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