Three-phase mass transfer: applications of the pseudo-homogeneous and heterogeneous models

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Abstract

This paper surveyed the most important, well known two-phase mass transfer models, namely film-, film-penetration- and surface renewal models, applying them to describe the three-phase mass transfer rates at the gas-liquid interface. These models should enable the user to predict the mass transfer enhancement in the presence of a third, in the mass transport active, dispersed phase. Depending on the particle size of the dispersed phase, the pseudo-homogeneous and/or the heterogeneous model can be recommended for nanometer sized and micrometer sized particles, respectively. The effect of all important mass transport parameters, namely particle size, surface renewal frequency, diffusion depth, solubility coefficient, has been shown by typical figures. It has been analyzed how strongly depends the applicability of the homogeneous- or the heterogeneous models not only on the particle size but on the mass transport parameters. As case study, the measured and the predicted mass transfer rates have been investigated in nanofluids.