Mechanistic model for dispersion coefficients in bubble column

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Abstract

A mechanistic model describing the mass and momentum exchange in bubble columns is proposed that is based on the observations that the gas distribution in a bubble column is not uniform across the column and that as a consequence large liquid recirculation cells are formed in such columns. The model provides insight into the mechanism of mass and momentum exchange in bubble columns and predicts turbulent viscosities in bubble columns that are similar to those reported in the literature. It also predicts axial and radial dispersion coefficients that are of the same order of magnitude as the reported data. Whereas the model is based on a description of the underlying physical phenomena, its validity and extrapolation is expected to be more reliable than that of empirical correlations.