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Identification of the two main transition velocities based on a novel combined approach validated in a bubble column operated with various water-glucose solutions

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Tytuł publikacji:	Identification of the two main transition velocities based on a novel combined approach validated in a bubble column operated with various water-glucose solutions
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Various flow regimes (FRs) are formed in bubble columns (BCs). Their boundaries are comparatively well studied only in an air-water system. In this work, a novel combined index (CI) was defined and extracted from gauge pressure (GP) fluctuations recorded in a BC (0.1 m in ID) operated with various aqueous solutions of glucose (1.0–13.2 wt%) and only deionized water at ambient conditions. Based on the same criterion (a well pronounced local minimum in the new parameter reaching an almost zero value) the two main transition velocities in the BC operation were successfully identified. The first transition velocity Utrans-1 distinguished the end of the homogeneous FR and the onset of bubble coalescence. It was found that with the increase of the glucose concentration in the mixture, the Utrans-1 value shifted to higher gas velocities. The same conclusion was reached for the dependence of the second transition velocity Utrans-2 on the glucose concentration. Both transitional gas holdups also increased with the glucose concentration. Empirical correlations between the first transition velocity and liquid viscosity and both transitional holdups and the liquid viscosity were derived.

Metryczka

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