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Identification of the Main Transition Velocities in a Bubble Column Based on a Modified Shannon Entropy

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Abstract : The gas holdup fluctuations in a bubble column (0.15 m in ID) have been recorded by means of a conductivity wire-mesh sensor in order to extract information about the main transition velocities. These parameters are very important for bubble column design, operation and scale-up. For this purpose, the classical definition of the Shannon entropy was modified and used to identify both the onset (at UG=0.034 m/s) of the transition flow regime and the beginning (at UG=0.089 m/s) of the churn-turbulent flow regime. The results were compared with the Kolmogorov entropy (KE) results. A slight discrepancy was found, namely the transition velocities identified by means of the KE were shifted to somewhat higher (0.045 and 0.101 m/s) superficial gas velocities UG.

Keywords : bubble column, gas holdup fluctuations, modified Shannon entropy, Kolmogorov entropy
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