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Slug length and frequency upstream a sudden expansion in gas– liquid intermittent flow

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Abstract: The purpose of this work is to analyze the influence of a sudden expansion on the upstream behavior of the horizontal gas–liquid slug flow. Measurements were made on a 40 mm ID pipe with and without a sudden enlargement of aspect ratio ? = 0.444. The experiments were carried out with two-phase air–water mixture. The slug lengths and frequencies were measured using a non-intrusive video technique. Upstream the sudden enlargement, it was observed that the mixture velocity has no influence on slug length. The variation of slug frequency is found proportional to the liquid superficial velocity for the two cases within this study. It was also observed that the behavior of the slug length and frequency was affected by the presence of the sudden enlargement. The comparison of the results obtained with various empirical correlations available in the literature showed that the latter are not worthwhile in the case where singularity is installed.

Keywords : slug flow, sudden expansion, slug length, slug frequency