Bubble and slug flows characteristic lengths in a microchannel

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We present an on-ground experimental study on the formation of mini-bubbles in a capillary T-junction. Such a device can be used as a generator of bubbles with small size dispersion. The T-junction is formed by two 1mm diameter capillaries, in which liquid and gas are injected perpendicularly. Generation and detachment of bubbles is provided by the liquid cross-flow. In nominal conditions, capillary forces dominate over inertia and buoyancy forces, making the T-junction performance gravity independent.

We address questions regarding the geometry of the continuous and discontinuous phases in both bubble and slug flow regimes. The classical concept of unit cell is used in this work to identify some relevant lengths of the two-phase flow, namely, bubble, liquid slug, and unit cell lengths (see **Fig. 1**). We conclude that these lengths can be predicted on the basis of a single relevant parameter, the mean void fraction or the Strouhal number.

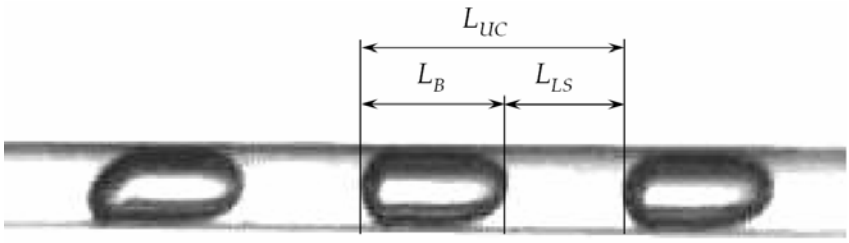

Fig. 1 Example of an intermittent two-phase flow formed by a train of bubbles. The unit cell is characterized by means of the bubble, L_B, the liquid slug, L_{LS}, and the unit cell, L_{UC}, lengths.