Flow-Induced Pulsations in closed side branches with wet gas

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In this paper, the coupling between acoustics and multiphase flow is investigated. Experiments are performed on two closed side branches, in two configurations. Shoebi Omrani (fiv 2012) investigates the influence of liquid on Flow Induced Pulsations in two closed side branches. Belfroid (PVP2013) reports even larger effects of liquid in case of whistling in corrugated pipes. For this study, two typical configurations of two side branches of equal lengths are studied: tandem configuration, where the distance between the side branches equals the double of their length, and quasi-cross configuration, where the distance between the side branches is as small as possible. These configurations are characterized by trapped, or nearly trapped, acoustic modes, which favor the occurrence of high- amplitude flow-induced pulsations (FIP), i.e. the whistling. The experiments reported focus on the evaluation of the effect of high amounts of injected water on FIP, measured at the top of the two side branches. For both cases, after a first test with dry gas, different amounts of water in droplet form were spread with a nozzle into the system, upstream of the side branches. In order to understand the effect of the type of flow, for both configurations, tests are performed with the injector far from and close to the first side branch. To avoid the influence of local resonance frequencies, an optimization of the resonators was also required. From the experimental results on both configurations, the pulsations in presence of water are lower compared to only dry gas. Despite the high amounts of liquid (up to 7 liters/minute), the whistling is not completely avoided. This behavior is different from the case of corrugated pipes reported by Belfroid (PVP2013). For the tandem configuration, the location of the injector has an influence on the results.