

2. Influence of an Acoustic Perturbation on the Flow Mixing in a T Junction

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Laser tomography was performed to study the influence of an acoustic perturbation on the flow mixing in a T junction. The flow velocity in the inlets (vertical ducts on the image) is fixed at 0.1 m/s corresponding to a Reynolds number Re of 180. Two small loudspeakers (LS1, LS2) are placed at a wall of the exit duct. The flow is seeded with oil particles only in one inlet. First, we consider the LS1 loudspeaker influence : Without acoustic perturbation (image a), the flow is laminar and a recirculating zone is observed in front of LS1 but the flow mixing is not efficient. The first noticeable effect of the acoustic perturbation appears near 530 Hz. Its influence increases with frequency and reaches a maximum near 800 Hz (images b, c, d). In fact, this value corresponds to the acoustic resonance of the exit duct. It induces a maximum acoustic pressure. Over 800 Hz, the perturbations decrease and disappear near 1kHz. If the loudspeaker is moved, for example in LP2 position, the acoustic influence becomes negligible whatever the operating frequency. This means that the acoustic perturbation position is very important : recirculating zones (as LS1) where the flow is not stable are particularly sensible.