

Portfolio

Influence of the Buoyancy on a Jet in Crossflow

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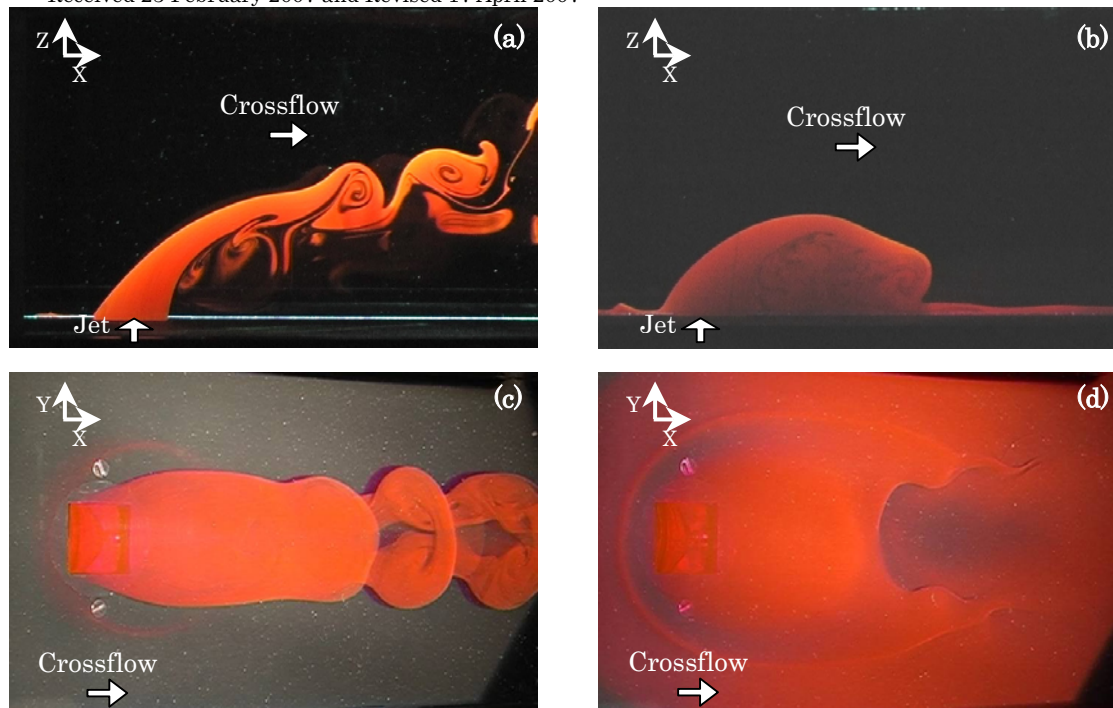


Fig. 1. $R = 0.86$ – tomographic views (a) and (b) - top views (c) and (d).

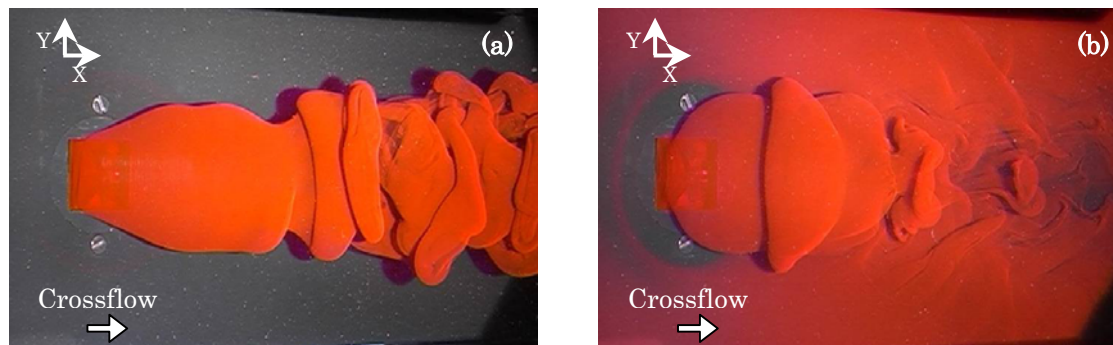


Fig. 2. $R = 1.44$ – top views (a) and (b).

These figures show colored square jets in crossflow. The Reynolds number is 487, based on the width of the jet orifice. The densimetric Froude numbers (Fr), based on the crossflow velocity and jet orifice, are 1 (right column) and ∞ (left column). R is the momentum ratio of the jet to crossflow. The Atwood number is much lower than 1. The tomographies are made in the symmetrical plan of the flow. The two figures show the influence of densimetric Froude number on the topology of the flow. Several new structures appear in the wake of the negatively buoyant jet (Figs. 1(d) and 2(b)). A transition can be observed, for the $Fr = 1$ case, between $R = 0.86$ and 1.44. The two unstationary structures of the $R = 0.86$ wake are replaced, in the $R = 1.44$ case, by rings of vortices that fall down on the floor.

References : Fraticelli, R., David, L., Thomas, L. and Borée, J., Influence of the buoyancy on a jet in crossflow, Int. Symposium of Flow Visualisation 12 (Göttingen), (2006-9).