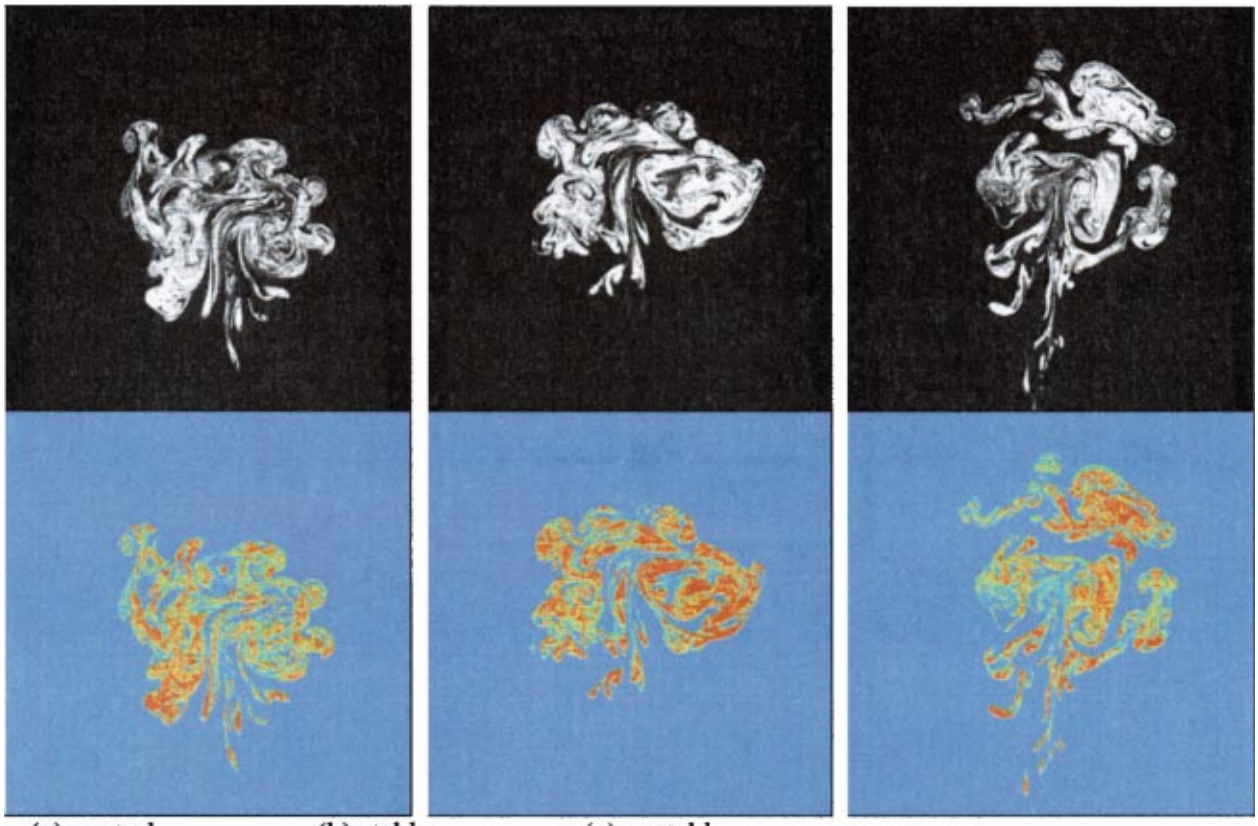

THE DIFFERENCES IN THE COUNTER-ROTATING VORTEX PAIR STRUCTURES IN A CROSSFLOW JET SUBJECTED TO VARIOUS THERMAL STRATIFICATIONS

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The instantaneous cross-cuts of the crossflow jet show the well-known kidney shape structures, but the features change their topology as well as scales according to the stability of the crossflow. Typical images of the counter-rotating structures taken at $x/d=50$ of the round jet issued normally to the uniform crossflow with the neutral, stable (269 °C/m), and unstable (−65.1 °C/m) stratifications are shown in Figs. (a), (b) and (c), respectively. The velocity ratio between the jet and the crossflow is 5.8. The corresponding Reynolds number based on the jet diameter (6 mm) and the jet velocity (5.8 ms/) was 2300. We used the olive oil aerosol having 2 microns of mean diameter as the seeding particles. The particles were supplied to the jet flow only in order to identify the interactions between the jet and the crossflow. A 200 mJ/pulse Nd:Yag laser with optical devices was used to provide a light sheet less than 1 mm thickness. The illumination time was set to be 4 ns. The instantaneous image was captured by a 1K×1K digital CCD camera and stored in a computer. The pseudo-colored images were obtained from the original black and white images to illustrate the relative concentration fields. The pictures give us physical insights implied in the ''conning'' and ''looping'' behaviors of the plumes which are mainly due to the thermal stratifications.

