

Abstract Submitted
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Vortex interaction during the pinch-off process in a starting jet

LEI GAO — Experiments on starting jets at three Reynolds number ($Re = 2600, 4100, 5600$) were performed to investigate the effect of interaction of the leading vortex ring (LVR) with trailing secondary vortices on the pinch-off process. The velocity and vorticity fields of the starting jet were obtained by using particle image velocimetry (PIV). It was found that after the formation number (i.e., the onset of the pinch-off process), secondary vortices develop in the trailing jet owing to the shear layer instability. These vortices then affect the dynamics of the trailing jet, especially the vorticity transportation into LVR. In the cases at higher Reynolds number, merging of LVR with the secondary vortices occurs during the pinch-off process, whose completion is indicative of the physical separation of LVR from its trailing jet. Therefore, although the formation number is relatively universal in all tested cases, the time of separation (i.e., the end of the pinch-off process) is actually sensitive to the Reynolds number due to its effect on the shear layer instability.

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