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The azimuthal and wavy deformation of vortex rings and the formation of separated flows in a round jet using synthetic jets AKINORI MURAMATSU, College of Science and Technology, Nihon University, KOHEI TANAKA, Graduate School of Science and Technology, Nihon University — Vortex rings are periodically formed in the initial region of a round jet and change to a wavy shape in the azimuthal direction. As a result, the vortex rings collapse three-dimensionally. It is suggested that the azimuthal deformation of vortex rings is affected by streamwise vortices. In order to investigate the relation between the azimuthal deformation of the vortex ring and the streamwise vortices, we attempted to artificially deform the vortex ring in the azimuthal direction using synthetic jets. The synthetic jets are formed utilizing a sound wave with a natural frequency for the vortex-ring formation. The vortex rings azimuthally and wavily deform by introducing disturbances through small holes at a nozzle exit, so that the streamwise vortices are generated at certain locations in the round jet. At the same time, the jet branches off slanting upward at the initial region in relation to azimuthal deformation of the vortex ring. The streamwise vortices are formed inside the vortex ring and move to the outside of the vortex ring, when the vortex ring is moving the downstream. At this time, the streamwise vortices are separated from the vortex ring. The branched flows, as similar to side jets, are formed by moving the streamwise vortices.

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