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Effects of density, velocity gradient, and compressibility on side-jet formation in round jets with variable density AKINORI MURAMATSU, Department of Aerospace Engineering, College of Sience and Technology, Nihon University — When a low density gas compared with the ambient gas is discharged from a round nozzle, side jets that are radial ejections of jet fluid are generated at the initial region of the jet. The density ratio between the jet fluid and the ambient fluid is a main parameter for the side-jet formation. Since the side-jet formation is also related to the instability of shear layer, it depends on the velocity gradient of the shear layer in the jet. The velocity gradient is evaluated by a ratio of the momentum thickness and the nozzle diameter at the nozzle exit. Compressibility suppresses the instability and the generation of the side jets. The compressibility is evaluated by a Mach number, which is a ratio defined by an issuing velocity of the jet and a sound velocity in the ambient fluid. Influence of these three parameters on the side-jet formation was examined experimentally. The density ratio and momentum thickness ratio were varied from 0.14 to 1.53, and from 14 to 155, respectively. The Mach number was varied to 0.7. Existence of side jets was confirmed by flow visualization using a laser sheet. Domains for the side-jet formation by the density ratio, the momentum thickness ratio, and the Mach number were determined.

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