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The vortex breakdown of a variable property jet with swirling flow. AHMAD ADZLAN FADZLI BIN KHAIRI, HIROSHI GOTODA, Ritsumeikan University, TOSHIHISA UEDA, Keio University — The vortex breakdown of a coaxial variable property jet with swirling flow has been experimentally investigated in this work, focusing on how the swirl of the inner and outer jets affect the formation of a stagnation point in the swirling jet. In the case of the CO₂ jet, the stagnation point flow is more easily formed compared to the air jet, and the stagnation point location was lower than that of the air jet. Stagnation point flow is also formed easier with the introduction of the swirl of the outer jet, and its location is also lower compared to the nonswirling case. The lowering of the stagnation point location of the swirling inner jet with density and viscosity differences due to the swirl of the inner and outer jets will be physically explained in this presentation by considering the theoretical equation obtained by analytically solving a simplified Navier-Stokes equation, (S. Matsubara, H. Gotoda, A. Adzlan, T. Ueda, Experiments in Fluids, 2011 (In press)) which has not been reported in previous research on fluid dynamics.

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