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Buoyancy Effects on the Development of the Leading Vortex Ring in a Starting Jet CAROLINA MARUGAN-CRUZ, JAVIER RODRIGUEZ-RODRIGUEZ, Carlos III University of Madrid, Spain, CARLOS MARTINEZ-BAZAN, University of Jaen, Spain — The initial development of negatively buoyant jets has been investigated experimental and numerically, more specifically the role played by gravity in the development of the leading vortex ring. A classical piston-cylinder arrangement has been used to produce the negatively buoyant jets. Under the experimental conditions considered in this work, the Froude number, Fr, which compares the jet momentum and the buoyancy flux is the most important parameter characterizing the dynamics of the flow. When the value of this parameter is sufficiently small the initial vortex ring generated at the start of the motion is pushed upwards by the gravity force before it can entrain enough vorticity to acquire a self induced velocity. However when the Froude number exceeds a critical value, Frc ~ 1, the vortex ring can travel downwards and entrainins vorticity from the trailing jet during a longer time. Total and vortex circulation, as well as the trajectory of the leading vortex have been measured to clarify the effect of gravity on the distribution of vorticity during the initial development of negatively buoyant jets.

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