

Abstract Submitted
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Velocity Field of Isolated Turbulent Puffs¹ ELHAM GHAEM-MAGHAMI, WPI, HAMID JOHARI, Cal State Northridge — The velocity field of isolated turbulent puffs was investigated by the PIV technique. Particular attention was paid to the entrainment pattern of isolated puffs. Puffs were generated by injecting seeded air through a 5 mm diameter nozzle into a flow chamber with a weak co-flow. Puffs with a Reynolds number of 5,000 were examined in the range of 35 – 75 diameters downstream of the nozzle. The injection time was varied in order to assess the effect of injection volume and impulse on the puff structure. The results indicate that as the injection volume increased, puffs elongated in the axial direction. The largest mean and fluctuating velocities were within the central portion of the puff. The maximum turbulent shear stress within the puff was as much as 2.5 times the steady jet value. The vorticity field showed the presence of vorticity throughout the puff volume. The ratio of volume flow rate at the puff center to the steady jet volume flux at the same location was largest for the smallest injection volume. The majority of entrainment into the puff occurs below the puff center while the puff cap pushes out into surrounding fluid.

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