

Computational Study of Passive Scalar Diffusion of a Counterflowing round Jet

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Abstract : Round jets have been widely studied due to their important application in industry. Many configurations of round jet were encountered in literature as free jet, co-flow jet, counterflowing jet and cross flow jet. In this paper, we are concerned with turbulent round jet in uniform counterflow stream which is known to enhance mixing and dispersion efficiency owing to flow reversal. This type of flow configuration is a typical application in environmental engineering such as the disposal of wastewater into seas or rivers. A computational study of a turbulent circular jet discharging into a uniform counterflow is conducted in order to investigate the characteristics of the diffusion field of the jet effluent. The investigation is carried out for three different cases of jet-to-current velocity ratios; low, medium and high velocity ratios. The Reynolds Stress Model (RSM) is used in the comparison with available experimental measurements. The decay of the center line velocity and the dynamic properties of the flow together with the centerline dilution of the passive scalar and the other characteristics of the concentration field are computationally analyzed in this paper.

Keywords : Counterflow stream, jet, velocity, concentration

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