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Majid Mohammadian

University of Ottawa, Canada

Numerical simulation of laterally confined vertical buoyant jets

In most cases, the density of wastewater effluents is less than that of the receiving water body. Therefore, the wastewater effluents are considered buoyant jet. A typical type of buoyant jets is the outfall of the wastewater treatment plants. In order to effectively design an outfall system, and minimize its environmental impact, the mixing mechanism of turbulent buoyant jets must be examined. It is essential to dispose the buoyant jets in a suitable condition, because these jets have dominant negative environmental impacts. In many cases, the effluent is bounded by limiting boundaries. This leads to a confined turbulent jet. The mixing characteristics of confined buoyant jets can be examined in different ways including experimental, numerical and theoretical methods. Limited studies in the literature are reported on numerical modeling of laterally confined vertical buoyant jets. In this paper, the mixing characteristics of a laterally confined vertical buoyant jet is studies using various turbulence models including the GGDH k-ε turbulence model which is a buoyancy-corrected model. The numerical simulation results are compared to other models and experimental data experiments. The study demonstrates that GGDH k-ε turbulence model improves the precision of simulations. It can thus be employed for examining the mixing characteristics of confined buoyant jets.

Biography

Majid Mohammadian is an Associate Professor at the Department of Civil Engineering, who is an expert in the research field of the computational fluid dynamics. He is a former MIT Researcher and has also had two years of research experience at Environment Canada and New York University. He carries out research in the areas of numerical modeling in marine outfall systems, river engineering, environmental hydraulics, turbulence and computational methods. He is an Associate Editor of the *Journal of Applied Water Engineering and Research, Taylor and Francis* (IAHR), Member of IAHR-IWA Leadership Committee on Marine Outfall Systems and was the Chair Person of the IAHR-IWA International Symposium on Outfall Systems (2016). The focus of his research is on marine outfall systems.

amohamma@uottawa.ca

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