Prediction of flow regimes in surface discharge of negative buoyant effluents into non stagnated water

Abessi, Ozeair [1]; Saeedi, Mohesn [2]; Hajizadeh Zaker, Naser [3];

1- PhD Student, Department of Hydraulics and Environment, School of Civil Engineering, Iran University of Science and Technology, Narmak, Tehran ,I.R. Iran. Email: Abessi@iust.ac.ir

2- Department of Hydraulics and Environment, School of Civil Engineering, Iran University of Science and Technology, Narmak, Tehran,I.R. Iran. Email:msaeedi@iust.ac.ir

3- Faculty of Environment, University of Tehran, Tehran, I.R. Iran. Email: nhzaker@iust.ac.ir

Abstract

Surface discharge of dens jet as a common way for disposal of produced waste water in coastal areas is strongly influenced by the hydraulical and physical fissures of discharge stream and ambient water. In the current study, considering different mechanisms of flow in surface discharge of negative buoyant jets, dominated regimes are studied. Using Length Scale (L.S.) method and utilizing an experimental set up which are merely designed for this studies, different flow regimes were experimentally simulated and its behavior were investigated. As a result of this study, the observed criteria for free jet regime, shoreline attached jet regime and intruding upstream plume in the case of surface discharge of dens jets were précised and their ranges of diversity in the form of dimensionless diagram were developed. The axis's of this diagram are a couple of dimensionless parameters that formed by the flow variables where each shows classification criteria in the boundaries of diagram. Finally, extracted criteria as a separator of these regimes were used to develop a tree-like classification scheme in surface discharge of dens jets. In this method, through identifying the range of flow variables in occurrences of each regime and sub regimes, coming prediction of flow characteristics by empirical equations will easily be possible.

Keywords: Marine outfalls, Waste water, Negative buoyancy, Inshore channels, surface discharge.