



Desalination brine disposal by means of negatively buoyant jets

G.C. Christodoulou*, I.G. Papakonstantis, I.K. Nikiforakis

School of Civil Engineering, National Technical University of Athens, Zografou 15780, Greece, Tel. +30 2107722813; Fax: +30 2107722814; email: christod@hydro.ntua.gr

Received 11 October 2013; Accepted 12 February 2014

ABSTRACT

Desalination plants commonly discharge large quantities of brine wastes into the adjacent coastal waters causing potentially harmful environmental impacts. To increase the effluent dilution prior to impingement on the sea floor, disposal by means of upwards inclined dense (negatively buoyant) jets can be applied. This paper presents an overview of experimental results on inclined negatively buoyant jets, focusing on the impact dilution achieved and illustrating its dependence on the jet inclination and the source characteristics, expressed by the densimetric Froude number F_o . It is shown that, in a stagnant ambient, the impact dilution for a certain discharge angle is well linearly correlated to F_o (for F_o , larger than about 20) and increases with the angle but is not very sensitive to it in the practical range between 30° and 75°. Typical dilutions attained are of the order of 50. The effect of ambient flow is also briefly discussed.

Keywords: Desalination; Brine disposal; Negatively buoyant jets; Dense jets; Dilution

*Corresponding author.

Presented at the International Conference WIN4Life 19–21 September 2013, Tinos Island, Greece