

Analytical solutions for brine discharge plumes on a sloping beach

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ABSTRACT

Large scale seawater desalination plants are operated along the coasts and dispose of their brine waste stream by discharging into the sea. As the need for desalinated seawater is steadily increasing, more new desalination plants are planned to be constructed. If desalination plants are closely clustered together along the coastlines, the adverse environmental impacts of the brine effluent discharges from plants such as these are strongly inter-dependent. A farfield mathematical model for continuous brine discharges from two desalination plants on a uniformly sloping beach is presented. The analytical solutions are illustrated graphically to study the interaction of two brine discharge plumes. Asymptotic approximation will be made to the shoreline's brine concentration to evaluate the maximum salinity build-up in the coastal waters.

Keywords: Brine discharge; Desalination plant; Sloping beach; Two outfalls

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