



Experimental studying of turbulent buoyant jet in a stratified fluid

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The dynamics of submerged turbulent positive buoyant jet in a stratified fluid is studied within the laboratory experiment, modeling the flow induced by submerged sewer system. The studying of such turbulent polluting flow diffusion and its interaction with the stratified environment in coastal zone is interesting as a physical and an ecological problem. The most important question in this problem is if the waste water is able to reach the ocean surface. The laboratory modeling is used to make such forecast for the real ocean conditions.

A theoretical model [1], which describes the dynamics of jet averaged characteristics, is used to obtain the scaling conditions and jet floating conditions. Those floating and slowdown regimes are indicated on a plane of the dimensionless parameters.

The experiments with a model of submerged sewer system are carried out for two different stratification types: saline and temperature. The first series of experiments is carried out for the case of pycnocline saline stratification, for verification of floating conditions in wide range of parameters (initial jet condition, geometry of submerged sewer system, stratification parameters). The second series is carried out in Large Thermostratified Tank of IAP RAS, with fixed parameters, for a complete scale modeling of the flow induced by typical sewer system in stratified environment.

The results of laboratory experiments are compared with theoretical forecasts and according to this a simple algorithm, which allows to estimate a facility of waste water floating up to ocean surface is proposed.

Within the experiments with temperature stratification a phenomena of internal wave generation by buoyant turbulent jets is found. The main characteristics of internal

waves are studied

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LITERATURE:

1. *Turner, J. S.* Buoyancy Effects in Fluids. Cambridge University Press. 1973.