



The investigation of internal waves excitation by turbulent buoyant jets

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Sewage disposal by coastal cities to the ocean is an example of man's impact on offshore zone. It produces sensible stress on coastal water areas, that's why investigation of hydrodynamic processes near submerged wastewater outfalls is important. We explored these processes basing on laboratory scale modeling. The experiments were carried out in Large Thermally Stratified Tank (overall sizes 20m*4m*2m) of IAP RAS. It was shown that internal waves were generated intensively in the Tank. A hypothesis was put forward that these waves were generated by buoyant jet oscillations in the thermocline region. In order to investigate the process of generation the additional series of experiments was set up in the LTST where we used a CCD videocamera for underwater survey. A string of 13 thermistors was placed vertically in 50 cm from the source to record the temperature oscillations. The data from the camera were processed out and the spectra of jet oscillations were compared to the spectra of the internal waves. Good agreement was obtained confirming that the waves were generated by buoyant jet. The mode structure of the jet was investigated. A theoretical model was developed explaining the origin of the peaks on the internal waves spectra. Basing on the jet velocity profiles obtained by PIV method the frequencies of unstable modes were estimated. The possibilities of the self-sustained waves generation were investigated. It was shown that different regimes with two modes were possible, where one prevailed on another or they existed together depending on the parameters of experiment.