

Evaluation of the Effect of Turbulence Caused by the Oscillation Grid on Oil Spill in Water Column

Authors : Mohammad Ghiasvand, Babak Khorsandi, Morteza Kolahdoozan

Abstract : Under the influence of waves, oil in the sea is subject to vertical scattering in the water column. Scientists' knowledge of how oil is dispersed in the water column is one of the lowest levels of knowledge among other processes affecting oil in the marine environment, which highlights the need for research and study in this field. Therefore, this study investigates the distribution of oil in the water column in a turbulent environment with zero velocity characteristics. Lack of laboratory results to analyze the distribution of petroleum pollutants in deep water for information Phenomenon physics on the one hand and using them to calibrate numerical models on the other hand led to the development of laboratory models in research. According to the aim of the present study, which is to investigate the distribution of oil in homogeneous and isotropic turbulence caused by the oscillating Grid, after reaching the ideal conditions, the crude oil flow was poured onto the water surface and oil was distributed in deep water due to turbulence was investigated. In this study, all experimental processes have been implemented and used for the first time in Iran, and the study of oil diffusion in the water column was considered one of the key aspects of pollutant diffusion in the oscillating Grid environment. Finally, the required oscillation velocities were taken at depths of 10, 15, 20, and 25 cm from the water surface and used in the analysis of oil diffusion due to turbulence parameters. The results showed that with the characteristics of the present system in two static modes and network motion with a frequency of 0.8 Hz, the results of oil diffusion in the four mentioned depths at a frequency of 0.8 Hz compared to the static mode from top to bottom at 26.18, 57 31.5, 37.5 and 50% more. Also, after 2.5 minutes of the oil spill at a frequency of 0.8 Hz, oil distribution at the mentioned depths increased by 49, 61.5, 85, and 146.1%, respectively, compared to the base (static) state.

Keywords : homogeneous and isotropic turbulence, oil distribution, oscillating grid, oil spill

Conference Title : ICOWE 2022 : International Conference on Oceanography and Water Engineering

Conference Location : Berlin, Germany

Conference Dates : May 23-24, 2022