World Academy of Science, Engineering and Technology
International Journal of Marine and Environmental Sciences
Vol:10, No:01, 2016

Hydrodynamic Performance of a Moored Barge in Irregular Wave

Authors : Srinivasan Chandrasekaran, Shihas A. Khader

Abstract : Motion response of floating structures is of great concern in marine engineering. Nonlinearity is an inherent property of any floating bodies subjected to irregular waves. These floating structures are continuously subjected to environmental loadings from wave, current, wind etc. This can result in undesirable motions of the vessel which may challenge the operability. For a floating body to remain in its position, it should be able to induce a restoring force when displaced. Mooring is provided to enable this restoring force. This paper discuss the hydrodynamic performance and motion characteristics of an 8 point spread mooring system applied to a pipe laying barge operating in the West African sea. The modelling of the barge is done using a computer aided-design (CAD) software RHINOCEROS. Irregular waves are generated using a suitable wave spectrum. Both frequency domain and time domain analysis is done. Numerical simulations based on potential theory are carried out to find the responses and hydrodynamic performance of the barge in both free floating as well as moored conditions. Initially, potential flow frequency domain analysis is done to obtain the Response Amplitude Operator (RAO) which gives an idea about the structural motion in free floating state. RAOs for different wave headings are analyzed. In the following step, a time domain analysis is carried out to obtain the responses of the structure in the moored condition. In this study, wave induced motions are only taken into consideration. Wind and current loads are ruled out and shall be included in future studies. For the current study, 5000 seconds simulation is taken. The results represent wave-induced motion responses, mooring line tensions and identifies critical mooring lines.

Keywords : irregular wave, moored barge, time domain analysis, numerical simulation
Conference Title : ICCOE 2016 : International Conference on Coastal and Ocean Engineering
Conference Location : Zurich, Switzerland
Conference Dates : January 12-13, 2016