

A WAVE FLUME STUDY OF REGULAR WAVE PRESSURES ON FLAT BOTTOM DECK ABOVE WATER

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The wave impact loads have significant influence on the safety and serviceability of coastal and offshore structures. Generally most of the structural members used in offshore production platforms or coastal structures are cylindrical in geometry. Research on wave slamming on cylinders has started in 1970's. Literature is scarce on the study of impact loading on flat bottomed structures like piers, mooring and berthing dolphins or jetties. Hence an attempt has been made to study the effects of impact loads due to wave slamming on decks of marine structures. Dalton et al. (1976) has investigated the slamming forces on the horizontal member fixed in the splash zone. Suchitra and Paul Mario koola (1994) investigated the slamming effect on horizontal slabs using regular waves at different frequencies with the measurement of vertical forces. Ghamry and Wang (1970) measured wave pressures on horizontal platform in wave flume, and identified the nature of typical wave-in-deck loads as a short duration or high magnitude impulsive impact superimposed on a longer slowly varying component of lower intensity. Bing Ren and Yongxue Wang (2003) investigated the irregular wave slamming on structure members with large dimensions in the splash zone. The empirical formula of the characteristic impact pressures and the spectral moment of the impact pressure on the structure are proposed. Kaplan et al. (1976) presented a mathematical model for determining time histories of vertical impact forces on platform horizontal structural members in the splash zone.

In the current work, this area is explored with the help of wave flume studies. This paper presents the experimental investigations of regular wave slamming on horizontal structural members with large dimension. The experimental setup consists of a Perspex plate of dimensions 2m x 1.95m. Fixed to a frame and the pressure transducers placed at an interval of 0.2m along the direction of the wave propagation. The whole setup is supported from a frame, which is placed atop the wave flume. The experimental set up is shown in fig.1. The model was tested for different time periods of range 1 to 2sec. with an interval of 0.2sec. and wave heights of range 10cm and 15cm. for different clearances of 2cm, and 4cm. The time and frequency domain analysis results of the regular wave impact pressure on the sub face of the structure under various clearances are presented. The influences of different incident wave parameters on the impact pressures on the structure are proposed.

The effect of d/L increases from 0.19 to 0.64 and b/B from 0.15 to 0.85 the crest and trough pressures for various e/H values have been presented. It was observed that, the increase in relative water depth d/L results in lowering of the crest and trough pressures.

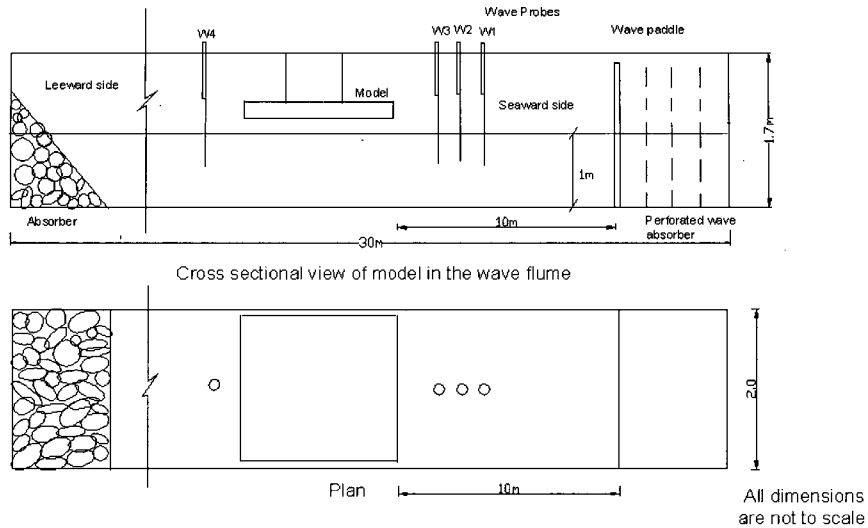


Fig. 1 Plan and cross sectional view of experimental setup

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