

Pressure Estimation based on Velocity Profiles on under Deck due to Wave Impact

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Abstract

This study presents the experimental results of the wave-in-deck phenomena caused by regular and focused waves. A series of experiments were conducted in a 2D wave flume with various deck clearances and waves having different parameters including wave heights and wave periods to measure the vertical forces and local pressures along the deck. The velocity fields of water under the deck were obtained by using Particle Image Velocimetry (PIV) system which were synchronized with the force and pressure measurements. The water velocity profiles under the deck were compared with those of the incident waves, and the quantitative effect of the deck were presented in the point of view on the water kinematics during the wave loading process. The pressure data was analyzed by computing the corresponding impulsiveness to assess the local severity of wave loads. Wave-in-deck loads due to focused waves were compares with those of regular waves corresponding to its crest height to discuss the effect of nonlinearity on wave loading. The PIV-based pressure estimation method was applied to predict pressures on the structure, and results were compared with the measured pressure data to assess the feasibility of the PIV-based estimation approach. The pressure estimation using velocity profiles taken by PIV technique were agreed well with measured pressure along the deck. It was noted that the PIV-based pressure estimation method would be alternative technique to evaluate the pressure and loading on the structure due the water waves.

Keywords: *Wave-in-deck load, Water waves, Particle Image Velocimetry, Pressure estimation*

Biography

Kwang Hyo Jung is Associate Professor, Dept. of Naval Architecture and Ocean Engineering at Pusan National University and Director of PNU Korea-UK Dual Graduate Program in Offshore Engineering. He worked as Sr. Coastal Engineer at Erickson researched in wave impact, hydrodynamics of offshore structure, ocean environment measurement and analysis, and pipe flow at Pusan National University, Busan, Republic of Korea.