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Real Wave Interaction Due to Semi-Infinite Marine Structure

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Extended Abstract

This study has investigated the real wave interaction due to semi-infinite breakwater using analytical solutions based on the Fresnel integral and Polynomial approximation solution of Fresnel integrals, and numerical solutions of boundary element method (BEM) based on the boundary integral equation [1]. When using the Fresnel integrals the mathematical equations and the boundary conditions became complicated, but when using the Polynomial approximation solution these things became less complex and were able to be expressed in more simple terms [2]. Using the Polynomial approximation solution also allowed for a fast approach to going through a great deal of data. The Fresnel integrals that were an analytical solution that has been traditionally used were reviewed under the same conditions as the former method, and the theories of both sides were compared. The efficiency of numerical calculation time of diffraction [3] by offshore structure and the accuracy of both theories were investigated. Also the numerical analysis of the boundary element method (BEM) was applied to semi-infinite offshore structure [4] and compared to the two analytical solutions [5, 6]. The comparison of analytical approach by gap type breakwater, in the six cases of different incident wave and in B / L =1.0 of width of gap, all of cases are in exact agreement. But the cases of 15°, 30°, 45°and 60°show a slight difference at 0.05 of diffraction coefficient between the two theories because of the remainder for both equations, which is $\varepsilon(u) \leq 0.002$.

The results obtained herein by this study provide information on how the results of boundary element method (BEM) approach the results of both analytical solutions such as the Fresnel integral and the polynomial approximation for the wave diffraction by semi-infinite breakwater which is installed on the offshore region. Excellent agreement exists for both analytical solutions for the real ocean environment.

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