

Run-up Estimation Due to Interaction Solitary Wave with Nonlinear Slope Beaches Using SPH Method

Ershadi, Cyrus^{1*}; Fathi, Amin²; Sadat Sharifi, Seyed Amir Reza³;
Jafarzadeh, Esmaeil³

1- Assistant Professor, Civil Engineering Department, Faculty of Technology and Engineering, Hormozgan University, Bandar-Abbas, Iran. Email: cyrusershadi1@yahoo.co.uk

2- Ph.D. Student of Marin Engineering, Faculty of Marin Engineering, Amirkabir University of Technology, Tehran, Iran. Email: aminfathi.1369@gmail.com

3- M.Sc. Student of Marin Structure, Faculty of Technology and Engineering, Hormozgan University, Bandar-Abbas, Iran. Email: esmaiel.jafarzadeh@gmail.com

Received Date: March 7, 2018

*Corresponding Author

Accepted Date: September 16, 2018

Abstract

In this study, the solitary wave was used to simulate shallow water wave. The Smooth Particle Hydrodynamics (SPH), that is a mesh-free Lagrangian method, has been used frequently to simulate nonlinear and free surface problem. The purpose of this study was to investigate the effect of solitary wave run-up on nonlinear beach slope in comparison with its linear state by SPH method. Also, solitary wave hydrodynamic characteristics were investigated at different time intervals. The results showed that the error of the presented SPH method in comparing with the experimental data was about 3.5%. Therefore, the proposed SPH method had a good agreement with experimental data. The results showed that the ratio of solitary wave run-up on nonlinear slope to linear slope ($R_{nonlinear}/R_{linear}$) decreased nonlinearly with increasing power or slope beach. Finally, a new formulation was proposed for determining the solitary wave run-up from nonlinear slopes to linear beach slopes.

Keywords: *Run-up, Nonlinear beaches, Solitary waves, Smoothed particle hydrodynamic method.*
