

Wave Height Prediction based on Wind Information by using General Regression Neural Network, study case in Jakarta Bay

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Abstract

Information about ocean wave is very important for naval navigation, port operations, offshore or nearshore activities around the sea waters. Moreover prediction of wave condition is necessary for design of harbour, coastal and offshore structures. Variations in wave heights are caused by wind pressure on free waves which make it random and uncertain, so that become difficult to predict. In previous studies, wave prediction have been carried out by using semi-empirical methods and conventional methods that require high resolution simulations and high computation. In this paper, we propose a method for prediction wave height from wind data by using a variant of Artificial Neural Network (ANN) with single pass associative memory-forward, so called General Regression Neural Network (GRNN). To obtain a set of training data, we perform numerical wave simulation by using SWAN (Simulating Wave Nearshore) model by using wind data obtained from ECMWF ERA-5. As a study area, we choose a rather shallow bathymetry and complex geometry, in Jakarta Bay, Indonesia. Results of prediction by using GRNN show a good agreement with wave data.

Key Words : General Regression Neural Network, Wave Prediction, Wind Waves, SWAN model.