THE PREDICTION OF SIGNIFICANT WAVE HEIGHT BY USING NEURAL NETWORKS IN PERSIAN GULF COASTS

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Key Word: *Prediction, Significant Wave Height, Neural Network, Persian Gulf*

ABSTRACT
As the sea wave is a key factor in the design of marine structures an accurate estimation of the wave characteristics is of particular importance. For this reason analytical and numerical models are applied to describe the wave parameters. Since the analytical methods is containing complicated mathematical equations and non linear terms in some cases the accurate solution of this equation is difficult. So some simplifying is performed to solve the equations. Sometimes the numerical model is employed that requires high computational grid number and memory volume which would be time consuming. In order to overcome to this problem the statistical and empirical method is used which is based upon the past observing data[1]. In recent decades the technique of artificial neural network (ANN) had been developed and proved that have high capability in the estimation of sea wave parameters.

INTRODUCTION
Estimation of ocean wave parameters is useful for design of harbor, coastal structures, offshore structures, defense purposes, coastal erosion, planning and wave energy estimation. waves are mostly generated by wind and have irregular characteristics, caused by the irregular nature of wind. Due to this irregular nature an accurate approach for predicting wave is of difficult tasks. In order to overcome to problems some statistical method is employed that ANN is one of the most effective which have proven their usefulness in oceanographic study such as simulation of waves. However, the artificial neural network (ANN) method is not defined as a specific equation form, it has an advantage over the empirical model as it can continuously re-train the new recorded data and adapt to update data. In the past decades the ANN approach, which is a non-linear black box model, was applied for wave and tide predictions. Some of these applications are as follows: Dina Makarynska (2007) predicted sea-level variation at the Cocos Islans with artificial neural networks with high accuracy[2]. Wenrui Haung et al. (2003) used ANN techniques to predict coastal water level along the South shore of Long Island, New York[3]. S.X. Liang (2008) applied ANN for prediction of tidal level including strong meteorologic effects[4]. Kemal Gunaydin (2008) worked in the estimation of monthly mean significant wave heights by using ANN and regression method[5].

STRUCTURE OF ANN
In this work back-propagation neural network(BPN) is used which is consisted of three layers[6]. The first one is the input layer and the last one is the output layer and the layers between the input and output is called the hidden layer[7]. each layer is made up of several