PREDICTION OF WAVE PARAMETERS USING SUPPORT VECTOR REGRESSION METHOD

Maziar . Golestani] مازیار گلستانی]
Mostafa . Zeinoddini] مصطفی زین الدینی]

Key Words: *Support Vector Machine (SVM), Support Vector Regression (SVR), Wave Spectra, Significant Wave Height***,** *Anzali Buoy, National Data Buoy Center*

1. INTRODUCTION

Knowledge about wave characteristics is very crucial in activities related to the ocean environment such as the building and maintenance of coastal and offshore structures, maritime transportation, environmental protection and etc. Different methods such as empirical, numerical and soft computing approaches have been proposed for significant wave height prediction. Numerical models are generally based on a form of the spectral energy or action balance equation. However, due to their complexity of implementation, high amount of processor time is required, and the need for accurate local bathymetric surveys, their implementation is not an easy task [2]. When the huge amount of exogenous information is not available and the computational resources and expertise are limited, data mining and machine learning approaches would be very good choices [4].

Recently, artificial neural net- works (ANNs) have also been widely used to predict wave parameters [2, 3]. It is indicated that neural networks can provide a viable alternative to statistical regression, time series analysis, numerical methods and approaches of this kind [3, 4]. The advantages are due to the improved accuracy, less complexity, smaller computational efforts and in some cases reduced data requirements. Mahjoobi et al [3] compared different soft computing methods such as artificial neural networks, fuzzy inference system and adaptive network-based fuzzy inference system to hindcast wave parameters. Their results showed that the models skills are nearly the same. Furthermore, Mahjoobi et al [2] studied the performance of Support Vector Regression approach in predicting wave height. They tested their model with data from a buoy in Lake Michigan. Also Deo et al [1] performed a study on wave spectra prediction using SVR. Their results were almost satisfactory.

The current study reports potential application of a SVR approach to predict the wave spectra and significant wave height in different sea environments and water depths. Support Vector Regression (SVR) solves regression problems based on the concept of Support Vector Machine (SVM) introduced by Vapnik (1995) [3]. It is a general algorithm based on guaranteed risk bounds of statistical learning theory [1]. Concurrent wind and wave records (standard meteorological and spectral density data) from 4 measuring stations were used both for the