Application of Data Mining Techniques in Coastal Engineering (Case Study: Wave Run-up on Cylindrical Structures)

Project Manager: **Dr. Mohammad Hossein Kazeminezhad**

Contributor**: Dr. Amir Etemad-Shahidi**

Abstract

The development of knowledge in the field of marine engineering and ocean sciences strongly depends on laboratory and field data, and in some cases without sufficient and precise analysis of the measured data, analysis, research and knowledge development in that area is not possible. In addition to engineering fields related to marine and oceanic sciences, the role of data in many other sciences is also very noticeable. In this study, different methods of data mining including Artificial Neural Networks (ANN), Fuzzy Inference System (FIS), Adaptive-Network-Based Fuzzy Inference System (ANFIS) and model tree are used to analyze the wave runup on cylindrical piles. In fact, the case study of this research is related to the estimation of wave runup height on the cylindrical piles which is one of the most important issues in the design of offshore structures, especially wind turbine foundations. In this regard, following the review of the existing methods, new models are developed based on the available experimental data. To do so, effective dimensionless parameters are identified. It was found that the governing nondimensional parameters those affect the relative wave runup heoght (runup height / wave height) are the wave steepness and relative wave height (wave height/water depth). Using different data mining techniques the relationship between the known and the unknown parameters (wave height height) were identified. Finally it was found that application of Artificial Neural Network leads to more accurate models for

estimation of the regular and irregular waves runup height, while use on model tree technique leads to the practical model.

Keywords

Monopile, fuzzy inference system, artificial neural network, runup height, model tree