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PREDICTION OF WAVE-INDUCED CURRENT OVER SUBMERGED BREAKWATERS USING ANN MODEL

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Abstract: A new prediction method for wave-induced current over submerged breakwaters/reefs applying coupling analytical model and artificial neural networks (ANNs) is proposed. An ANN was designed and trained using generated current data from Analytical Current Model (ACM) developed by Gourlay and Colleter (2005). Calculated discharge using the proposed model was compared with the measured experimental data collected by Tajziehchi and Cox (2006). Comparison of calculated and measured discharge over submerged breakwater reveals the accuracy of the trained ANN model (using artificial data) and its capability in predicting discharge over submerged breakwaters/reefs.

Keywords: Submerged breakwater; Wave-induced current; Artificial Neural Networks.

INTRODUCTION

Submerged breakwaters are currently being used in coastal area to protect shorelines from erosion without spoiling coastal view. The main application of submerged breakwaters in coastal areas is to reduce wave energy reaching the beach, by activating waves to break and dissipate their energy over the structure. The effects of breakwater submergence, wave climate, distance of structure to shoreline and crest width of breakwater on wave and current hydrodynamics and morphological seabed and shoreline changes are still developing. Improving the knowledge of submerged breakwaters effects on nearshore waves and currents leads to more accurate calculation of sediment transport and morphological evolution in the vicinity of the structure. Providing a new approach to predict wave-induced current over submerged breakwaters is the main goal of this study.

Limited studies have been reported that predict wave-induced current over submerged breakwaters/reefs (Loveless et al., 1998; Drei and Lamberti,1999; Gourlay,1993, 1996a; Symonds et al., 1995; Gourlay and Colleter, 2005 and Tajziehchi and Cox, 2006). Computational prediction models called "artificial neural networks" (hereafter ANNs) have proven to be useful in many fields of technology. These kinds of models have already been

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