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TITLE OF DIPLOMA THESIS:

Investigation of the Status and Behaviour of a Floating Breakwater Utilising Data from a Network of Sensors

AUTHOR: Lazaros Theodoridis

ABSTRACT

A large percentage of marine structures operating today around the world are reaching or have already exceeded their design life. Consequently, the monitoring of their performance through the application of Structural Health Monitoring (SHM) systems has become an issue of critical importance. A direct result of the monitoring process is the identification of the status of the structure, including damage identification and detection and therefore, the improvement of the structure's maintenance procedures.The objective of the present thesis lies within this research field (SHM of marine structures), that attracts nowadays a great scientific interest. More specifically, in the present thesis, the measurements of a SHM system installed on the floating breakwater of the port of N. Marmaras, Chalkidiki are utilised in order to investigate and assess the status of this structure, as well as it behaviour under the wave action. Considering that during the monitoring of the aforementioned structure with the SHM system, the connectors between two modules composing the breakwater failed, the objectives of the present thesis are: (a) Investigation/assessment of the status of the examined structure before the occurrence of the connectors' failure ("initial" status of the structure) and using appropriate statistical parameters that represent the aforementioned status of the structure and (b) Investigation of the effect of the connectors' failure on the statistical parameters that define/describe the "initial" status of the structure. To achieve all of the above, the correlation coefficients between quantities measured by the SHM system (mooring lines' tensions), and between quantities measured by the SHM system and quantities directly derived from them (significant wave height) are calculated and plotted. Based on the pattern and variation of the aforementioned correlation coefficients for each of the examined periods of the structure's status (before and after the connectors' failure), conclusions are drawn with regard to: (a) the position of the mooring lines, as well as (b) the performance of the structure under the action of waves of different directions and of different characteristics.

KEYWORDS

Marine structures, Floating breakwater, Structural health monitoring, Effect of failure, Correlation coefficient