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## QUALITY CONTROL OF THE ASTARA WAVE MEASUREMENT BUOY DATA IN DEEP WATER

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**Key Words:** Wave measurement buoy, Data Quality Control, Caspian Sea

### Introduction

Wave buoys can provide basic marine information which has applications in wave modeling, design of offshore structures .... Wave measurement may sometimes have error. Some of the error reasons are: sensors defect, hard marine condition of the buoy working area, loss of buoy motion freedom due to anchor, error in the data transmission, etc.

Thus consistency checking and quality control of the wave measurement buoy data is very important. This article deals with the design of the quality control algorithms and the result of the applying the algorithms on the field data of the Astara wave measurement buoy in the deep waters of Caspian Sea.

### Wave Measurement Data Types

Wave measurement data can be divided into three types:

- a) Time series, which are the some sensors output sequence mounted on the buoy, such as yaw, roll, pitch angles and heave sensor outputs.
- b) Spectral values which are obtained by time-to-frequency transformations, such as heave spectrum, mean wave direction and direction spreading per frequency.
- c) Bulk values which are delivered one sample per each data acquisition period. These values contain meteorological and oceanographic data such as temperature, wind speed & direction, underwater current speed & direction ... and also contain the processing results on the water elevations time series and spectral values.

### Quality Controls on the Wave Measurement Data

The quality control algorithms are defined for each of the mentioned three data types [1-4]. In these algorithms the validity of the wave measurement data is judged. The quality control algorithms decide between one of the three cases: 1-correctness (OK), 2-weak quality but applicable (soft flag), 3-invalid and inapplicable (hard flag).

This work presents the result of applying the quality control algorithms on the data of the Astara wave buoy of Kepco Company. Applying the quality control algorithms is very time-consuming process due to the huge amount of the time series and spectral data. Thus a professional software is used in this work which is designed and developed for the first time in the country. Some of the quality control tests are as the following:

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- Co to auto spectral ratio check
- Roll/ pitch consistency
- Heave spectrum frequency range
- Swell wave direction test
- Wave height Rayleigh and heave Gaussin fitness test
- Consistency between the heave time series and the heave spectrum
- Wave check ratio test

### **Conclusion**

Various tests have been performed on the buoy data using the developed algorithms. The result of applying the quality control algorithms on the wave measurement data shows that it is possible to detect the error events using different tests; and then finally deliver correct and reliable data for users.

The control parameters of error detection can be adjusted for other marine areas by empirical data. So the developed quality control algorithms can be extended to other field measurements.

### **References**

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