Simultaneous Measurement of Wave Pressure and Wind Speed with the Specific Instrument and the Unit of Measurement Description

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Abstract : The focus of this paper is the description of an instrument called 'Quattuor 45' and defining of wave pressure measurement. Special attention is given to measurement of wave pressure created by the wind speed increasing obtained with the instrument 'Quattuor 45' in the investigated area. The study begins with respect to theoretical attitudes and numerous up to date investigations related to the waves approaching the coast. The detailed schematic view of the instrument is enriched with pictures from ground plan and side view. Horizontal stability of the instrument is achieved by mooring which relies on two concrete blocks. Vertical wave peak monitoring is ensured by one float above the instrument. The synthesis of horizontal stability and vertical wave peak monitoring allows to create a representative database for wave pressure measuring. Instrument ‘Quattuor 45' is named according to the way the database is received. Namely, the electronic part of the instrument consists of the main chip ‘Arduino', its memory, four load cells with the appropriate modules and the wind speed sensor 'Anemometers'. The 'Arduino' chip is programmed to store two data from each load cell and two data from the anemometer on SD card each second. The next part of the research is dedicated to data processing. All measured results are stored automatically in the database and after that detailed processing is carried out in the MS Excel. The result of the wave pressure measurement is synthesized by the unit of measurement kN/m². This paper also suggests a graphical presentation of the results by multi-line graph. The wave pressure is presented on the left vertical axis, while the wind speed is shown on the right vertical axis. The time of measurement is displayed on the horizontal axis. The paper proposes an algorithm for wind speed measurements showing the results for two characteristic winds in the Adriatic Sea, called 'Bura' and 'Jugo'. The first of them is the northern wind that reaches high speeds, causing low and extremely steep waves, where the pressure of the wave is relatively weak. On the other hand, the southern wind 'Jugo' has a lower speed than the northern wind, but due to its constant duration and constant speed maintenance, it causes extremely long and high waves that cause extremely high wave pressure.

Keywords : instrument, measuring unit, waves pressure metering, wind seed measurement
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