ABSTRACT

An assessment of the wave energy resource at the location of the Danish Wave Energy test Centre (DanWEC) is presented in this paper. The Wave Energy Converter (WEC) test centre is located at Hanstholm in the North West Denmark. Information about the long term wave statistics of the resource is necessary for WEC developers, both to optimise the WEC for the site, and to estimate its average yearly power production using a power matrix. The wave height and wave period sea states parameters are commonly characterized with a bivariate histogram. This paper presents bivariate histograms and kernel density estimates of the PDF as a function both of $H_{m0}$ and $T_p$, and $H_{m0}$ and $T_{0.2}$, together with the mean wave power per unit crest length, $P_w$, as a function of $H_{m0}$ and $T_{0.2}$.

The wave elevation parameters, from which the wave parameters are calculated, are filtered to correct or remove spurious data. An overview is given of the methods used to do this, and a method for identifying outliers of the wave elevation data, based on the joint distribution of wave elevations and accelerations, is presented.

The limitations of using a JONSWAP spectrum to model the measured wave spectra as a function of $H_{m0}$ and $T_{0.2}$ or $H_{m0}$ and $T_p$ for the Hanstholm site data are demonstrated. As an alternative, the non-parametric loess method, which does not rely on any assumptions about the shape of the wave elevation spectra, is used to accurately estimate $P_w$ as a function of $H_{m0}$ and $T_{0.2}$.

QUALITY CONTROL

Time Series Quality Control

The wave elevation data is transmitted, via radio link, to a computer onshore and stored in ASCII files, each containing 30 minutes of non-directional wave elevation data, sampled at 2.56 Hz.

In Tucker & Pitt (2001) spurious “spikes” in the wave elevations records are flagged by when

$$h_c > 5\sqrt{m_0},$$

where $h_c$ is the maximum surface elevation between two zero-crossings relative to the mean sea level and $\sqrt{m_0}$ is the rms surface elevation. Here, the approach is to consider the joint distribution of wave

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