Abstract

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An Overview of Wavelet Analysis and Its Application to Ocean Wind Waves

Wavelet analysis is considered a state-of-the-art technique in signal processing it transforms the signal into a scale-time representation (scalogram) with high resolution, preserving the temporal characteristics of the signal. In the present study, an overview of Fourier analysis, short-time Fourier analysis, and wavelet analysis are given, and the differences between them are addressed. To demonstrate the importance of wavelet analysis in the field of coastal engineering and other related fields, a summary of the recent literature concerning its applications is given first, and then wavelet analysis is used to analyze the complex phenomenon of wave growth due to a sudden change in the wind conditions. This study shows that the temporal characteristics of the time series of wind speed and significant wave height can be explored qualitatively by using the complex Morlet wavelet analysis. The results reveal that the waves are responding immediately to the sudden change in wind conditions.