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A Data-Adaptive Ocean Wave Directional-Spectrum Estimator for Pitch and Roll Type Measurements

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ABSTRACT

A data-adaptive directional-spectrum estimator is developed for “point” measurement systems such as the pitch and roll buoy and slope array. This estimator, unlike the much employed unimodal cosine power parameterization method of Longuet-Higgins and others, does not make *a priori* assumptions about the shape of the directional spectrum. Instead improved resolution is obtained with a maximum likelihood method similar to those successfully used with spatial arrays. The numerical algorithm is relatively simple and computationally fast. The capabilities and limitations of the new estimator are illustrated with a variety of synthetic directional spectra. The estimator is applied to field data obtained from a slope array in 9 m depth at Santa Barbara, California and is found to yield physically realistic directional spectra. It marginally resolves two directional modes that topographical features dictate should be separated by approximately 70 degrees.

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