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On the Interpretation of Ocean Current Spectra. Part 1: The Kinematics of Three-Dimensional Vector Time Series

Jack Calman

Department of Earth and Planetary Sciences, Massachusetts Institute of Technology, Cambridge 02138

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ABSTRACT

A general method for representing and interpreting the spectra of three-dimensional vector time series is outlined. Part I contains the formalism for the kinematic interpretation of a single vector time series. Based on the spectrum density matrix, the formalism unifies and extends to three dimensions several descriptions of a vector process. These are the Cartesian, rotary, rotational invariant and hodograph spectrum representations. Empirical modes, which are properties of the measured time series (not of any geometrical or dynamical assumptions) are introduced. These allow independent orthogonal motions at the same frequency to be separated. Finally the notion of a prespecified spectrum, which automatically picks out that part of the measurement which is consistent with all imposed dynamical assumptions. is advanced.

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