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Calculation of turbulent dissipation rate with Acoustic Doppler Velocimeter

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Turbulent dissipation rates are calculated from an Acoustic Doppler Ve-locimeter (ADV) by fitting the measured wavenumber spectrum to a universal turbulence spectrum. A combination of the Butterworth filter and empirical model decomposition (EMD) isemployed to eliminate Doppler noise and high-frequency fluctuations. Different from the classical inertial subrange dissipation method fitting to the Kolmogorov -5/3 slope, we propose the method here which can make longeravailable spectrum bands. We analyzed 408 bursts with turbulent dissipation rates ranging from 10-8 to 10-5W kg-1as measured in the coastal ocean of the South China Sea, and found for all of these bursts, features of the clean spectrum can be resolved to the dissipation range of turbulence, in which about 15% bursts can be resolved to the Kolmogorov wavenumber, and 51% to 1/2 Kolmogorov wavenumber. Comparisons of this method with the inertial subrange method indicated that its estimated turbulent dissipation rateswere somewhat smaller than thosefrom the inertial subrange methodin most of the bursts. Their ratios had a mean value of 0.77, which is typical for oceanic turbulence measurements.