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Deconvolution as a means of correcting turbulence power spectra measured by LDA PREBEN BUCHHAVE, Intarsia Optics, CLARA VELTE, Technical University of Denmark — Measurement of turbulence power spectra by means of laser Doppler anemometry (LDA) has proven to be a difficult task. Among the problems affecting the shape of the spectrum are noise in the signal and changes in the sample rate caused by unintentional effects in the measuring apparatus or even in the mathematical algorithms used to evaluate the spectrum. We analyze the effect of various causes of bias in the sample rate and show that the effect is a convolution of the true spectrum with various spectral functions. We show that these spectral functions can be measured with the available data from a standard LDA processor and we use this knowledge to correct the measured spectrum by deconvolution. We present results supported by realistic computer generated data using two different spectral estimators, the so-called slotted autocovariance method and the so-called direct method.

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