

Abstract Submitted
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Dead time effects in turbulence spectra measured by burst-mode LDA CLARA VELTE, Technical University of Denmark, PREBEN BUCHHAVE, Intarsia Optics, WILLIAM GEORGE, Imperial College London — Dead time effects in laser Doppler measurements have not so far been considered a major problem. We show how dead time occurs in burst-mode laser Doppler anemometry (LDA) when using a so-called burst-mode LDA processor and describe their effects on the measured power spectra. We show how dead time effects may be caused by more than one seed particle being present in the measurement volume at the same time and explain analytically how dead time causes a reduction in the power in the spectrum at low frequencies and an oscillation in the spectrum at the high frequency end. We also present a realistic model for the data sampled from a processor with dead time and use this model to generate turbulence velocity data in a computer. Finally we compare the spectrum computed from realistic values of dead time and sample rate in the computer generated data and compare this spectrum to a measured spectrum in a free turbulent jet with similar parameters. The excellent agreement between the features of these spectra show that our model and explanation of the dead time effect is a valid one.

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