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**Power Spectrum Estimation of Randomly Sampled LDA Signals** PREBEN BUCHHAVE, CLARA VELTE, Technical University of Denmark, WILLIAM GEORGE, Imperial College — Power spectra from LDA data must be computed using the theory of burst-mode LDA processing in which the sampling bias is corrected by means of the measured residence time [1,2]. However, the validity of this method has been disputed, and alternative methods have been proposed, partly on theoretical grounds, partly with reference to practical problems with the measurement of the residence time [3]. We present power spectra computed by a number of different algorithms (i.a. the block averaged direct spectral estimator, the Fourier transform of the slotted autocovariance estimate and the sample-and-hold method) using simulated data from 3-D turbulent velocity, and we show that only residence time weighted algorithms give the correct answer in all situations. We also demonstrate clearly effect of using the wrong algorithms by processing some single frequency spectra. We confirm these conclusions by evaluating power spectra from a turbulent jet [4]. The power spectra from the jet data show good agreement with the results from simulated data. [1] Buchhave, Ph.D dissertation 1979 [2] Buchhave, George and Lumley, Ann. Rev. Fluid Mech. 1979 [3] Albrecht, Borys, Damaschke and Tropea, Springer Verlag pp. 552, 2003 [4] Velte, Ph.D. dissertation 2010

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