

Abstract Submitted
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Velocity Extraction from PDV Data Using Advanced Fourier Transform Techniques MICHAEL FURLANETTO, Los Alamos National Laboratory — Photon Doppler Velocimetry (PDV) experiments return surface velocimetry data encoded in the form of time-dependent amplitudes. Typically, these data are analyzed by sliding short-time Fourier transforms (STFTs), which return frequency (velocity) distributions at a number of discrete time windows. The parameters for these STFTs – sample length, window size and parameters, and overlap – are often chosen empirically. However, the analysis procedure is usually the largest single source of uncertainty in the returned velocity data, and although the STFT parameters affect the accuracy and precision of the result, their precise impact has not been quantified. Using synthetic PDV data sets, this study has investigated the accuracy with which a single velocity can be extracted by STFT techniques. The impact of the STFT parameters on the resulting accuracy has been measured computationally. Additionally, the increased accuracy gained by the use of multi-resolution and fractional Fourier techniques have been measured, along with the increased computational cost.

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