Data processing algorithms for laser interferometric diagnostics of fast processes

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The new data processing algorithms for femtosecond laser ranging (Lidar) and photon Doppler velocimetry (PDV) that allow to increase measurement precision of kinematic parameters of fast-moving objects were proposed.

The Lidar algorithm, based on the Fourier transform with matched non-linear frequency modulation, allows to compensate for both the influence of the high-order dispersion in fiber-based dispersive Fourier spectrometer, and the influence of imbalanced dispersion in the interferometer.

The reassignment method allows to collapse the beat frequency spectral line in PDV spectrograms, which is broadened due to windowing in short-time Fourier transform.

The proposed algorithms were tested on computer simulated and experimental data.