



FLOW VISUALIZATION IN INDUSTRIAL COMBINE HARVESTER FANS: OPTIMIZATION OF PIV ALGORITHMS FOR LOW TRACER CONCENTRATION

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ABSTRACT

In order to increase combine harvesters productivity limited by air blowing grain separation rate combine harvester fan air flow experimental study was carried out using PIV technique. Industrial experimental conditions did not allow providing all requirements necessary to obtain data of desired quality for all PIV advantages realization.

Obtained images (fig. 1, a) contained bright nonhomogeneous background furthermore tracer concentration was significantly lower than required to efficient work of correlation algorithm. Therefore image processing algorithm was modified for background removal. Also a time-spaced image combining was implemented in order to obtain images containing tracers with concentration sufficient for correlation analysis (fig. 1, b) and spatial resolution improvement. Special software modification was performed to provide algorithm improvements realization (fig. 1, c). Resultant images allowed performing correlation analysis and obtaining fan air flow velocities distribution data.

The results of this study show that PIV is applicable to analysis of air flows under actual operating conditions provided that additional processing of experimental images is performed.

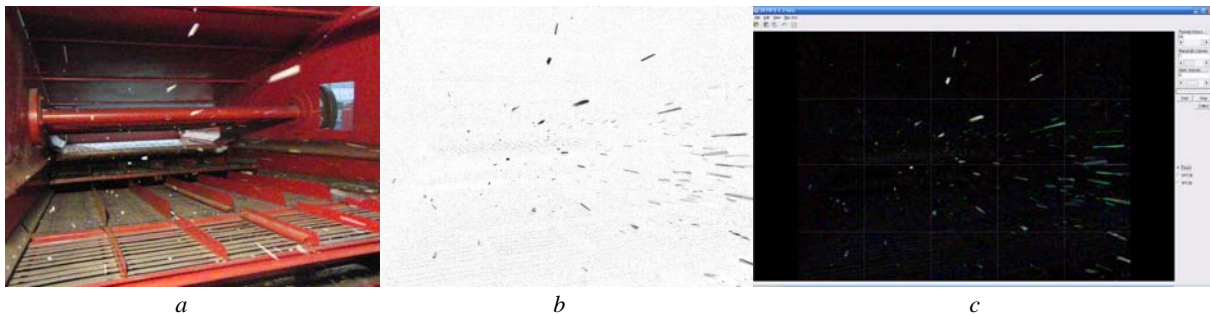


Fig. 1 Original image obtained in experiment (a), processed image after background removal and 3 images combining (b) and software window with intermediate correlation analysis result (c).