Abstract Submitted
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Improving the Accuracy of the Laser Doppler Accelerometer Technique HOLGER NOBACH, Max Planck Institute for Dynamics and Self-Organization, MATTHIAS KINZEL, TU Darmstadt, EBERHARD BODENSCHATZ, Max Planck Institute for Dynamics and Self-Organization, Physics and Mechanical and Aerospace Engineering, Cornell University — The measurement of particle accelerations gives insights into the fundamental properties of fluid flows. The basic principles of the Laser Doppler Accelerometer (LDA) technique follows closely those introduced in Lehmann et al. (2002). Recently it was successfully applied to a commercial of-the-shelf laser Doppler system by Kinzel et al. (2006). Since then we implemented numerous improvements in the signal processing and increased the reliability. In order to reach acceptable resolution of the measurement system, both, the optical setup and the signal processing system must realize the highest possible accuracies. The main contribution of this study is the assessment of the accuracy of the method, and the quantification of the errors due to optical fringe divergence in the detection volume and due to signal processing using a falling wire as a reference. — Lehmann B, Nobach H, Tropea C (2002): Measurement of acceleration using the laser Doppler technique. Meas. Sci. Technol. 13(9):1367-1381 — Kinzel M, Nobach H, Tropea C., Bodenschatz E (2006): Measurement of Lagrangian acceleration using the laser Doppler technique. Proc. 13th Int. Symp. on Appl. of Laser Techn. to Fluid Mech., Lisbon, Portugal

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