On the possibility of using mobile phone cameras for quantitative flow visualization

R. Hain¹, N.A. Buchmann, C. Cierpka¹
1: Institute of Fluid Mechanics and Aerodynamics, Universität der Bundeswehr München, Germany
* Correspondent author: rainer.hain@unibw.de

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HIGHLIGHTS
• A mobile phone camera in combination with a cw-laser is used for quantitative flow visualization in water.
• A comparison with measurements performed with a scientific high-speed camera shows a good agreement.
• For quantitative flow visualization of water flows with moderate velocities, the simplistic setup provides accurate results.
• Limitations and the range of possible applications are discussed in the paper.

ABSTRACT
Mobile smart phones were completely changing people’s communication behavior within recent years. However, these devices do not only offer communication through different channels but also devices and applications for fun and recreation. In this respect mobile phone cameras include now relatively fast (up to 240 Hz) cameras to capture high speed videos. It was the scope of the current analysis to evaluate if an imaging system featuring a mobile phone’s camera and a low budget cw-laser would be useful for PIV. The study was focused to a flow in water. Figure 1 shows the experimental setup. A pco.dimax camera was used as a state-of-the-art device for comparison of the results. The flow was provided by a free-jet which was driven by a syringe pump. Mean velocities of the streamwise component are shown in Fig. 2. The correspondence is good and nearly no differences can be seen, neither in low-speed nor in high-speed regions in the mean fields. The same holds for the fluctuating velocities which are not shown here but which are given in the presentation as well as in the full paper. Overall a very good agreement between the low-cost camera and the scientific high-speed camera is observed. Thus, a mobile phone camera is well suited for flow investigations and offer great possibilities for industrial applications and especially for educational purposes.