

Abstract Submitted
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Determining the Onset of Turbulent Flow Using Video Based Motion Analysis¹ ROBERT BARTON, COREY LEMLEY, PAUL FRENCH, SUNY College at Oneonta — Recent advancements in computing technology have drastically improved the interface between computers and video equipment, thus allowing for the improvement of video-based motion analysis. However, analysis of video data remains susceptible to errors caused by lens distortion, angular distortion, descaling, and discretization. In previous work, methods were developed to correct for some of these errors. This paper presents several improvements to these corrections, as well as additional methods to increase accuracy, including: 1) improvement of the measurement of lens distortion, 2) automation of the lens distortion correction technique, 3) a simulation method to test the correction of lens distortion error, 4) creation of an algorithm to correct for angular distortion, and 5) refinement of a two camera system to correct for descaling error. The methods were tested in the context of the measurement of the air resistance force on a high-speed projectile. This allowed for the determination of the onset of turbulent flow. These significant improvements in accuracy have made video-based analysis an even more powerful tool for the study of motion.

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