

Paper 6.3

Stereoscopic Particle-Image Velocimetry (PIV)

A New Approach Using Telecentric Lenses

by

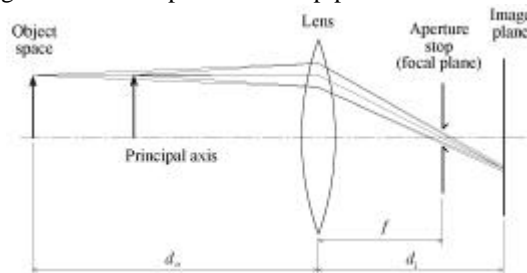
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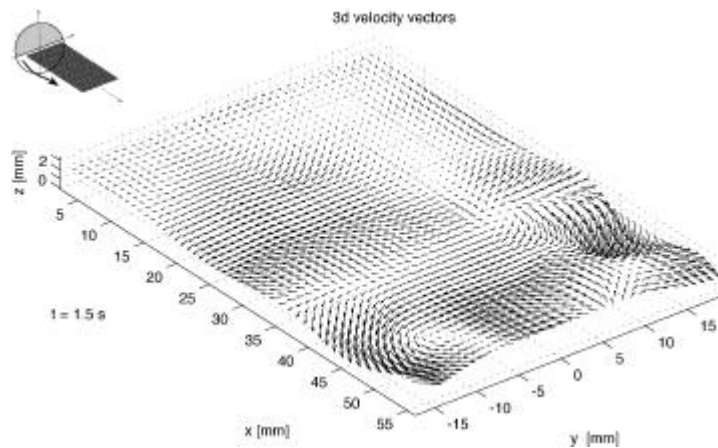
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ABSTRACT

A new stereoscopic approach based on telecentric lenses is introduced. The method offers in-focus imaging at high viewing angles (highly tilted object planes) without systematic image distortion. Telecentric lenses form images by the parallel projection of the object space onto the image plane, because the perspective centre is at infinity. Objects of same size at various distances from the lens will always appear the same size in the image, which is the difference to conventional (entocentric) lenses, where the magnification changes at different object distances. In non-stereoscopic PIV applications telecentric lenses can be used to eliminate projection errors. The stereoscopic setup described in this paper uses lenses telecentric in both object and image space. It overcomes many limitations of the classical methods using entocentric lenses. The setup has been successfully applied for Particle-Image Velocimetry (PIV) measurements of separated flows downstream a segmental orifice plate inside a pipe.



Lens telecentric in object space.



Three dimensional velocity vectors of a pipe flow downstream a segmental orifice plate ($Re = 1000$).