



A NEW TECHNIQUE FOR STEREO-CAMERAS SELF-CALIBRATION IN SCHEIMPFLUG CONDITION

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ABSTRACT: Camera calibration is a necessary preliminary step for Stereo PIV measurements. A traditional approach is to image a calibration target supporting known control points, possible for different known displacements and to deduce from the correspondences the relationship between the conjugate planes [Soloff et al]. For reliable results, this approach requires an accurate positioning of a high-precision target in space. In order to relax these practical constraints which are respectively time-consuming (especially in large test facilities) and costly (one high-precision target per magnification value), we proposed to self-calibrate PIV cameras [Fournel et al]. Thus a bundle adjustment technique which is a non-linear least square optimization method allows to estimate both the camera parameters and the coordinates of the control points. This can be done thanks to a high redundancy obtained by imaging the planar target, by hand front, at different localizations in space.

The redundancy for self-calibration can be increased by replacing the localization of the second video-camera by the rigid transformation of the stereo device. Thus, a new stereo-cameras model and its respective self-calibration is developed. In this paper, the new model and its calibration are defined. Experimental results on both simulated and real data show the relevance of the proposed technique for self-calibration.

References

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