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Recent developments for a photogrammetric system to measure offsets to stretched wires at CERN

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Manual offset measurements with respect to stretched wires are used since decades for accelerator alignments at CERN, e.g. for the SPS and the LHC. A measurement system based on photogrammetry offers appreciated possibilities of automation in comparison to the manual method used so far for the radial offset measurement. Such a system built with pre-calibrated cameras is under development for different possible applications e.g. measurements in the LHC arcs or the upgrade of the LHC collimator measurement train.

The article deals with the use of image processing techniques like morphological operators and the Hough transformation for the identification and precise sub-pixel edge measurement of the stretched wire in the 2D images. The magnet fiducials are measured by means of an ellipse operator in the images. In addition, the calculation process to get the positions of the straight wire and the fiducials in 3D with CERN's compensation software LGC is described. The related algorithms have been evaluated based on image data acquired in the LHC accelerator. The attained accuracy is typically of a few hundreds of millimetres.

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