

Micro-triangulation for high-accuracy short-range measurements of fiducial points and wires.

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The micro-triangulation method is proposed as an alternative for magnet fiducialisation. The aim is to directly measure the fiducial points and the stretched wire at the same time, space, and coordinate system, attempting to reduce the uncertainty. We use robotic theodolites equipped with a camera to automatically measure horizontal and vertical angles to the fiducial points and the stretched wire. The presentation gives an overview of the subject, including the objectives, the developments and the challenges in using micro-triangulation for fiducialisation. We describe the necessary least-squares analysis methods, computer vision algorithms and software tools we developed to enable data acquisition and processing for the fiducialisation. We also present the first test measurement aiming to demonstrate the feasibility of the method and to evaluate the accuracy. The preliminary results are very promising, with accuracy better than 20 μm for the wire position, and of about 40 $\mu\text{m}/\text{m}$ for the wire orientation, compared with a coordinate measuring machine.

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