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A method of measuring mirror-tilt error in laser trackers

Laser trackers are widely used in large-scale measurement such as accelerator alignment, aerocraft assembly and ship building. The mechanical and optical structure errors in laser trackers such as mirror tilt and offset introduce systematic errors which have essential influence on the measurement accuracy. In this paper a method for measuring mirror-tilt error of the laser tracker was presented by using autocollimators, multi-mirror polygons and reflected mirrors. Firstly, an autocollimator was used to detect the position of the tracker ' s mirror and the direction of the tracker ' s horizontal axis with the help of the reflected mirror mounted on one side of the axis. Then the other autocollimator and the multi-mirror polygon were used to detect the horizontal rotation angle of the tracker. According to the relationship among the readouts of the collimators, the mirror-tilt error can be attained. The least square method was also used to deduce the precise measurement results. The experimental results showed that the method proposed in the paper can detect the tilt error precisely.

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