A new interference sensor for ultra-precise measurement of laser beam angular deflection

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A new interference sensor for ultra-precise measurement of laser beam angular micro deflection is presented. Also angular tilt of measuring device in relation to the beam axis can be measured. The laser beam is divided into two beams in the system of reflecting surfaces. After reflecting the beams, they are combined again in the common direction of propagation so that they interfere with each other creating a picture of interference fringes recorded by the photodetector sensitive to the change of the fringe period. The number of these reflecting surfaces for both beams differs by an odd number. The measured angular deflection is determined on the basis of the change in the period of fringes that interfere with each other, and they are recorded by the photodetector. The theoretical basis of the angle evaluation basing on analyzed fringe period is presented. Design of the device is shown. The dimensions of the sensor with the housing are about of: 50x35x30 mm. Metrological feasibilities are experimentally estimated. The device is applied for laser beam angular stabilization. Attempts are made to use it for measurements of CMM rotational errors.

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[3] M. Dobosz, „Optymalizacja konstrukcyjna układu interferometrycznego do pomiaru mikro-odchyleń kątowych" Mechanik Nr11, pp.1696-1699, 2016