


Original Paper

Modeling and Analysis on Alignment Error of Four Path Step Gauge Interferometer

M. Abe , O. Sato and T. Takatsuji

Dimensional Standards Group, Research Institute for Engineering Measurement, National Metrology Institute of Japan, National Institute of Advanced Industrial Science and Technology, Umezono 1-1-1, Tsukuba, Ibaraki 305-8563, Japan

 **M. Abe**
Email: makoto.abe@aist.go.jp

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Abstract

The four path laser interferometer has been used for calibration of step gauge. Preceding studies adopting four path laser interferometer have achieved the expanded uncertainty of about 0.5 μm for 1000 mm. On the other hand, there is a concern remained that the alignment procedure seems to be tedious and the resulted uncertainty estimation becomes an empirical one. The current study aims to build an error model expressing cosine error appeared in the optical system of the four path laser interferometer. The result of model analysis points out that conventional error estimation may cause nonnegligible under estimation on cosine error. The model analysis performed to clarify error propagation of angular deflection of plane mirrors of the four path laser interferometer requires thorough consideration for estimating its contribution to the uncertainty.

Keywords

Step gauge; Four path laser interferometer; Alignment; Cosine error