1. INTRODUCTION

The PICOSCALE Interferometer is a versatile and easy-to-use interferometric displacement sensor with three measurement channels. It allows to measure displacements with picometer resolution and nanometer accuracy. The firmware module Calculation System allows for real-time processing of the position signals so that measurements of angles can be directly performed (without the need of a user PC to perform these calculations). In this application note, straightness measurement of a translation stage is demonstrated. As compact and light targets such as thin mirrors can be used, the stages can be characterized without the need of high loads, which may deteriorate the sample unnecessarily.

2. SETUP

The setup without mounting aids is shown in an artistic view in Figure 1. A PICOSCALE sensor head assembly (PS-ACC-HA-3A-C01) with three sensor heads in a pre-aligned mount is aligned to a light-weight 1 inch mirror. The mirror is fixed on a translation stage with an appropriate adapter. In the PICOSCALE Calculation System the signals of the three sensor heads are processed to directly output the pitch and yaw of the mirror while the stage is moved by 20 mm.

3. RESULTS

An exemplary straightness measurement of a translation stage is shown in Figure 2. Over a stroke of 20 mm the stage shows a pitch ($R_x$) of about 140 µrad and a yaw ($R_y$) of 80 µrad.

4. CONCLUSION

Straightness measurements of translation stages are one of the typical applications for the PICOSCALE Interferometer. Compact and easy-to-align sensor heads and the possibility to use lightweight targets enable performance characterization even of small stages without high load.

FEEDBACK

“We are using the PICOSCALE Interferometer in our quality assurance center to guarantee every stage meets its specifications. We programmed a set of measurement protocols for high throughput. My colleagues appreciate the easy and fast alignment procedure.”

Max Meessen, Quality Assurance Manager at SmarAct

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1 SmarAct offers individual and customized adapters. Please contact us for more info.
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