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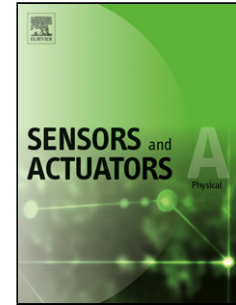
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Birefringence angle sensor for optical displacement measurements

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Highlights for review:

1. A birefringence angle sensor (BAS) was proposed for application on a displacement measurement in a homodyne interferometer.
2. The BAS was fabricated using a potassium titanyl phosphate (KTP) immersed with glycerin liquid in a cylindrical glass container.
3. The proposed KTP-BAS has the advantages of a flexible incident angle and a wide linear dynamic range.

ABSTRACT:

A birefringence angle sensor (BAS) was proposed herein for application on a displacement measurement in a homodyne interferometer. The BAS was fabricated using a birefringence plate of potassium titanyl phosphate (KTP) immersed with glycerin liquid in a cylindrical glass container. The lateral displacement of a probe light induces a refractive angle change in the KTP through the curve interface in the glass container. According to the relationship between the displacement and the refracted angle change in the BAS, the measured phase is dependent on the angle change to further obtain actual displacements. Moreover, the flexible incident angles for a tunable sensitivity benefit the displacement measurement range determined by the proposed KTP-BAS.

Keywords: birefringence; optical angle sensor; displacement measurement; homodyne interferometer.

1. Introduction

Highly precise and widely dynamic linear displacement measurements are important in achieving fine position control in an automatic mechanical system [1]. Therein,

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