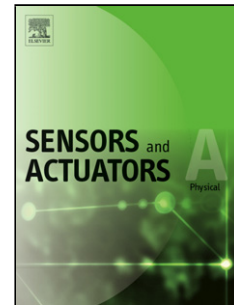


Accepted Manuscript

Title: All Fiber Torsion and Displacement Sensor Based on Image Detection

Author: Yao Xu Guobin Ren Yu Liu Yue Wu Youchao Jiang
Wenxing Jin Ya Shen Yuguang Yang Shuisheng Jian



PII: S0924-4247(17)31048-8
DOI: <https://doi.org/doi:10.1016/j.sna.2017.10.046>
Reference: SNA 10412

To appear in: *Sensors and Actuators A*

Received date: 7-6-2017
Revised date: 15-10-2017
Accepted date: 17-10-2017

Please cite this article as: Yao Xu, Guobin Ren, Yu Liu, Yue Wu, Youchao Jiang, Wenxing Jin, Ya Shen, Yuguang Yang, Shuisheng Jian, All Fiber Torsion and Displacement Sensor Based on Image Detection, *Sensors & Actuators: A. Physical* (2017), <https://doi.org/10.1016/j.sna.2017.10.046>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

All Fiber Torsion and Displacement Sensor Based on Image Detection

Yao Xu^a, Guobin Ren^{a,*}, Yu Liu^a, Yue Wu^a, Youchao Jiang^a, Wenxing Jin^a,
Ya Shen^a, Yuguang Yang^a, Shuisheng Jian^a

^a*Beijing Jiaotong University, Institute of Lightwave Technology, Key Laboratory of All Optical Network and Advanced Telecommunication Network of EMC, Jiaoda East Road, Haidian District, Beijing 100044, China*

Abstract

We propose an all-fiber-optic sensor for simultaneous rotation and displacement measurement based on elastic-optic effect in a dual mode fiber. LP_{01} and LP_{11} modes are both excited in the fiber and are distinguished using wavelength-scanning Spatially and Spectrally resolved imaging technique (S2 Imaging) to accomplish rotation and displacement detection. Mode rotation is characterized by the LP_{11} mode rotation using elastic-optic theory; a displacement area of $120\ \mu\text{m} \times 120\ \mu\text{m}$ is detected and measured by recording the trace of LP_{01} mode pattern. Balance between the detection range and resolution of the sensor is adjustable by simply changing the fiber length or adjusting the relative position of fiber-end, lens and the CCD camera. Real-time detection at $\sim 0.5\text{s}$ per measurement speed is achieved, and twist rate and moving velocity can also be measured.

Keywords: Few mode fiber, Rotation sensor, Displacement, Fiber application, Fiber characterization

2010 MSC: 00-01, 99-00

[☆]Fully documented templates are available in the elsarticle package on CTAN.

^{*}Corresponding author

Email address: gbren@bjtu.edu.cn (Guobin Ren)

URL: 13111019@bjtu.edu.cn (Yao Xu)

Download English Version:

<https://daneshyari.com/en/article/7133903>

Download Persian Version:

<https://daneshyari.com/article/7133903>

[Daneshyari.com](https://daneshyari.com)