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Astigmatic detection systems have been used in hybrid systems to produce both contact and noncontact profilometers, which provide advantageous features such as low cost, small laser spot, high bandwidth, and compact size. However, current astigmatic optical profilometers cannot provide quantitative height measurement on a surface consisting of complex materials. In this paper, a novel method called z-axis modulation is proposed to overcome this limitation. A homemade astigmatic optical profilometer was developed, and an analytical process for height calculation was also developed. As demonstrated by the experimental results, z-axis modulation can provide accurate height measurement. Furthermore, optical properties such as reflectivity can also be measured.

General information
Publication status: Published
Organisations: Department of Micro- and Nanotechnology, Nanoprobes, National Taiwan University
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Number of pages: 6
Publication date: 2018
Peer-reviewed: Yes

Publication information
Journal: Measurement Science and Technology
Volume: 29
Issue number: 10
Article number: 107002
ISSN (Print): 0957-0233
Ratings:
BFI (2018): BFI-level 2
Scopus rating (2018): CiteScore 2.21 SJR 0.57 SNIP 1.243
Web of Science (2018): Impact factor 1.861
Web of Science (2018): Indexed yes
Original language: English
Keywords: Optical profilometer, Height measurement, Reflectivity
Electronic versions:
pp_A_novel_method_for_quantitative_height_measurement_based_on_an_astigm.._.pdf. Embargo ended: 14/09/2019
DOIs:
10.1088/1361-6501/aadc49
Source: FindIt
Source ID: 2438583930
Research output: Contribution to journal › Journal article – Annual report year: 2018 › Research › peer-review