3D Shape Measuring Instrument

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1. Technology Overview

3D shape measuring instrument for measuring the 3D shape of an object to be measured by using white interference fringes. The phase-crossing algorithm is proposed for white-light interferometry, which uses the multi-color phase information of spectrally decomposed interferograms recorded simultaneously with color-sensitive image sensors. The location of zero optical path difference is identified as the singular point at which the phase becomes color invariant, and is determined accurately with a sub-sampling-interval resolution from the crossing point of the multi-color phase distributions obtained by the Fourier transform method.

2. Instrument and Method

- ***Schematic of measurement site***

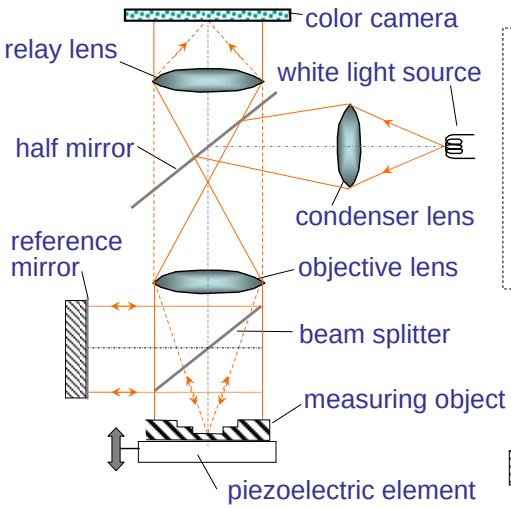


Fig.1 Essential structure

- ***Block diagram***

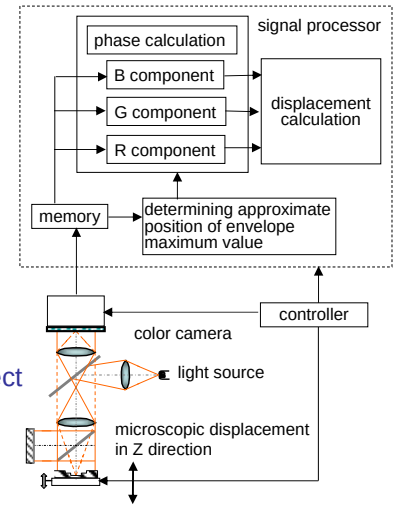


Fig.2 Block diagram showing an entire configuration

- ***Phase-crossing algorithm***

Flowchart showing the procedures for finding the envelope of an amplitude of the white light the phases of the three interference fringe signals

(1) Obtain respective white light of R,G, and B components
(2) One-dimensional Fourier Transformation
(3) Filtering
(4) Inverse Fourier Transformation
(5) Obtain envelope
(6) Detect position to each maximum
(7) Detect position where phases are equal

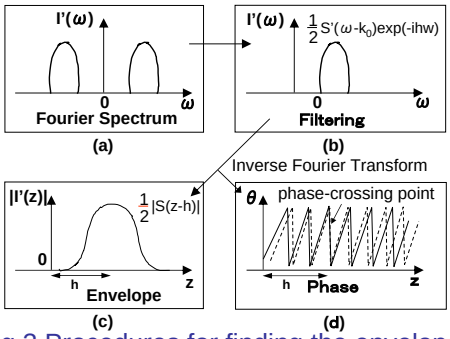


Fig.3 Procedures for finding the envelope and the phases

3. Measuring Data

- ***Measuring***

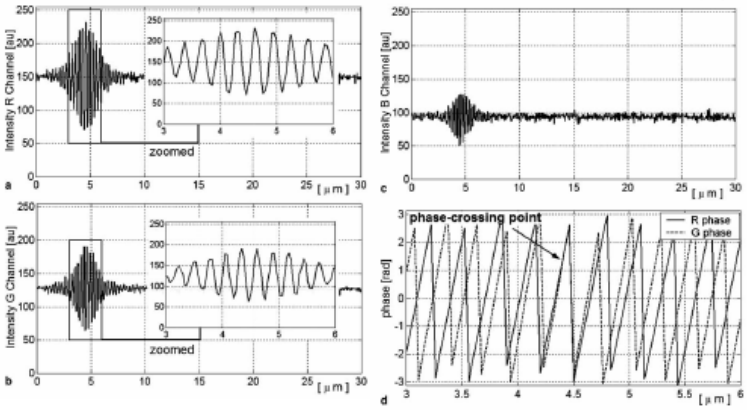
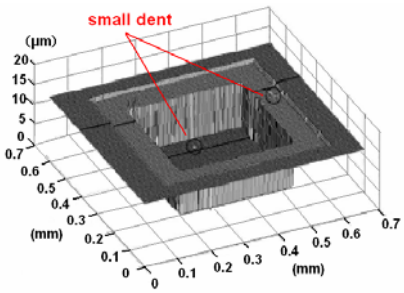


Fig.4 Three color fringe signals detected at arbitrarily selected the object; (a), (b), and (c) correspond to the signals from red, green and blue channels. The wrapped phase distribution obtained for the red and green channels is presented in (d).



The well-shaped object with two-fold steps. Small dents on the object surface are marked with circles to identify their locations.

Fig.5 Results of measurements

4. Examples

- ***Photographed Image and 3D shape measuring***

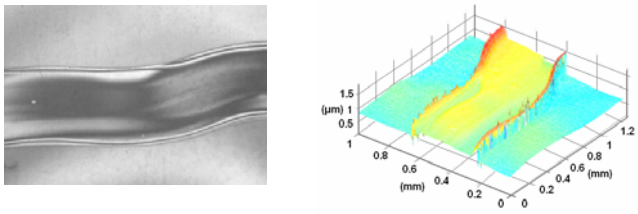


Fig.6 Ink trace written on the glass

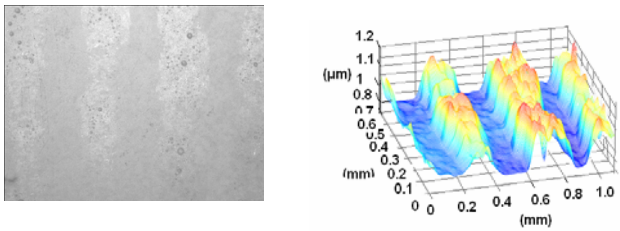


Fig.7 Fingerprints attached on the glass

5. Patent status & Patent owner contact

- **Patent license is negotiable.**

Patent No. : WO2006-068217
Apply country : JP,US,KR,CN,
Patent owner contact: Intellectual Property office, University of Electro-Comm.
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