

Investigation of a signal processing method based on a dual-detection chromatic confocal probe

Ryo Sato^{1,#}, Chen Li¹, Hiraku Marsukuma¹ and Wei Gao¹

¹ Department of Finemechanics, Tohoku University, 6-6-01 Aramaki Aza-Aoba, Aoba-ku, Sendai, Miyagi 980-8579, Japan
Corresponding Author / Email: ryo.sato.b8@tohoku.ac.jp, TEL: +81-22-795-6952, FAX: +81-22-795-6953

KEYWORDS: Confocal probe, Surface profile, Dual-detection, Tracking intersection method, Tracking local-minimum method

A new signal processing method based on a dual-detection confocal probe, which is referred to be tracking intersection (TI) method, is investigated in this paper. Chromatic confocal probe employing a mode-locked laser as a light source has been developed for surface profile precise measurements. The chromatic confocal probe can measure the linear displacement by employing a signal processing method, which is referred to be tracking local-minimum (TL) method, for a pair of confocal response curves from a dual-detection units. However, the output from the TL method has an asymmetric response curve, which is one of the main reasons of the measurement accuracy. The reason for the asymmetric response is due to the shape of the local-minimum point position at which the TL method in the confocal responses. Therefore, an intersection point of the confocal response curves are newly employed as a signal processing point instead of the local-minimum point in this paper. TI method is newly investigated to improve the measurement accuracy of the dual-detection confocal probe based on a numerical and experimental considerations.

Word count: Not more than 500 words