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An Evaluation of Topography Measurement using Experimental Raytracing.

ABSTRACT - Masterthesis

Precise measurement of shape is a crucial point in manufacturing of optical elements. Traditional tactile methods implicate risk of damaging the optical component or mold. Optical methods like confocal microscopy are limited in maximum slope angle. A new type of sensing element based on the principle of "Deflectometry and Experimental Ray Tracing", combines source and sensing element in a single device. For this, correct determination of centroid is fundamental. Many state of the art methods are available for gradient measurement.

In this thesis, some of these methods are discussed and a new approach was proposed. To verify this approach a simulation model of designed experimental setup was done using Zemax. A schematic comparison of algorithms were made for this approach and performance evaluation of slope measurement was done using Python. Also, algorithms part standardized in DIN, were implemented for centroid measurement of laser beam. The surface under test is taken as a specular surface like laser mirrors. The simulation results are analyzed and documented in this report. Conclusions were drawn from this analysis and the future scope was discussed.