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Simulation of Tri-sensor Deflectometry for Freeform and Structured Specular Surfaces

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ABSTRACT

Freeform and structured specular surfaces have been widely used in optics, aerospace and MEMS/NEMS fields. For complex surfaces, fast high precision measurement is always a challenging requirement of product designers and manufactures. Recently, stereo-deflectometry has been proposed to measure the slope information of detected surfaces. However, this method possesses some blind points when measuring specular surface with steps. We propose that tri-sensor deflectometry consisting of three cameras and a LCD screen, could measure freeform and structured specular surface quickly. This poster will briefly describe how tri-sensor deflectometry works. A horizontal and vertical sinusoidal fringe pattern acting as a LCD screen and a parabolic surface are simulated. The three cameras simultaneously capture the phase information of the distorted fringe patterns via the detected specular surface. The simulation of phase unwrapping and integration processes is discussed.

Keywords: tri-sensor deflectometry; phase unwrapping; slope and position integration