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Three Dimensional Surface Topography Using LCD Pattern Transfer Method JAVAD R. GATABI, WILHELMUS GEERTS, Department of Physics, BRYANT AARON, DAN TAMIR, Department of Computer Science, R.K. PANDEY, Department of Electrical Engineering, Texas State University — Laser lithography on curved surfaces has recently been researched due to its applicability in production processes for devices that combine integrated optical, mechanical, magnetic, and/or electronic technologies. Several laser lithography methods have been reported for pattern transfer to convex and cylindrical surfaces, but there is not a general methodology for arbitrary 3D surface lithography. This project implements an optical method for laser lithography on arbitrary 3D surfaces. An illumination pattern generated by a transparent LCD is projected through an optical microscope on top of a 3D surface and recorded by a camera. The focus quality and the distortion of the observed image depend on the local topography of the sample. The effect of the local sample topography on the projected pattern is theoretically investigated using Zemax ray-tracing software. Analysis are made for amplitude and phase modulation LCDs with different resolutions and compared with preliminary experimental results. The authors acknowledge financial support from NSF through an MRI-grant (grant: 0923506).

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