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Projection on tilted screens using a phase only spatial light modulator JAVAD R. GATABI, BILL MCKENNA, Department of Physics, Texas State University, San Marcos, TX 78666, KUMAR PANDEY, Department of Electrical Engineering, Texas State University, San Marcos, TX 78666, DAN TAMIR, Department of Computer Science, Texas State University, San Marcos, TX 78666, WILHELMUS J. GEERTS, Department of Physics, Texas State University, San Marcos, TX 78666 — We are developing a new laser lithography exposure tool for use on non-flat substrates. Such a tool does not currently exist as commercial equipment used in the electronic industry uses high numerical aperture (NA) lenses to create patterns with critical dimensions down to 22 nm on very flat substrates (+/- 100 nm). The ability to pattern thin films on top of curved substrates with large topography differences allows for the development of new products and devices. We investigated the use of a phase only spatial modulator to project images on inclined and curved surfaces in such exposure equipment. Starting from the Rayleigh-Sommerfeld diffraction equation, expressions for the diffraction between tilted surfaces were derived. These expressions were used in an iterative algorithm to determine the modulator phase pattern required for a proper projection of an image on a curved surface. An approach similar to that of Gerchberg and Saxton [1] was followed. The algorithm was implemented using a Holoeye LCD phase only modulator. It was shown to be stable and converging for simple binary test patterns. A similar approach may be used for projection from a tilted surface to a curved surface.

[1] R. W. Gerchberg, W. O. Saxton, OPTIK, Vol. 35 (No.2) 237-246 (1972).

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