Department of Electrical Engineering & Computer Science
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Optimisation of a Novel Photopolymer for Use in Holographic Data Storage

ABSTRACT - Masterthesis

This thesis presents the work performed at the Centre for Industrial and Engineering Optics (IEO) at the Dublin Institute of Technology during my Master Course in Electronics Engineering at the Hochschule Bremen.

The project was focused on the development of a holographic test system for page format data storage and the initial characterisation of different photopolymers as recording materials for holographic data storage applications.

First, a test system was build up including a HoloEye Spatial Light Modulator (SLM). The work consisted of software development for loading data pages into the SLM and reading the same data pages after imaging them onto a CCD camera. Therefore the computer program LabVIEW was used.

The software encodes any kind of data file into two dimensional data pages which consists of black and white pattern representing digital '0' and `1'. The maximum image contrast between these black and white pattern was obtained by modulating the hardware parameter of the SLM.

The test system was then implemented into a set-up for holographic data storage (HDS). A program was written to estimate the Bit error rate of transmitted data pages. The raw bit error rate (rBER) of the system was estimated to quantify the systems ability for holographic data storage.

Two different photopolymers, developed in the Centre for Industrial and Engineering Optics, were investigated as a recording material for holographic data storage applications. The data pages were recorded in the photopolymer with different exposure intensities and different exposure times. The BER of these holograms was measured to estimate optimal parameters for recording data pages in a good quality. Finally, an angular multiplexing system was used to investigate the possibility of superimposing data pages in the photopolymer.