

Simulation of 360-degree Semi-mechanical Table Top Electronic Holographic Display System

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1. Introduction

Although 3D (3D) holographic displays are considered the ultimate display, the realization of a 3D holographic display is a practical challenge. The table top holographic display system is one of the next generation 3D holographic display systems. Recently, a prototype of the 360-degree holographic table-top display was introduced. This system consists of three digital micromirror device (DMD) for R/G/B colors, 4-f Fourier off axis filtering systems, a parabolic mirror for 3D object and a mechanical motor for time-sequentially displaying 360-degree images on the viewing circumference [1]. The prototype needs to replace the mechanical rotation part with the non-mechanical but equivalent part, which is one of challenges.

In this presentation, we report a design and simulation of semi-mechanical table top holographic display system based on diffractive optics. We design and simulate a diffractive multi-focus grating (MFG). And we are supposed to set up the MFG in the table-top system instead of conventional huge mechanical part. The MFG is based a diffraction optical elements (DOEs), it is designed as a carrier wave that can deliver image information toward the desired direction [2, 3]. The conventional system generates 1,024 holographic multi-views sequentially, but in this study, we propose the semi-mechanical system consist of fewer and debulked mechanical parts.

2. Simulation of semi-mechanical table top system

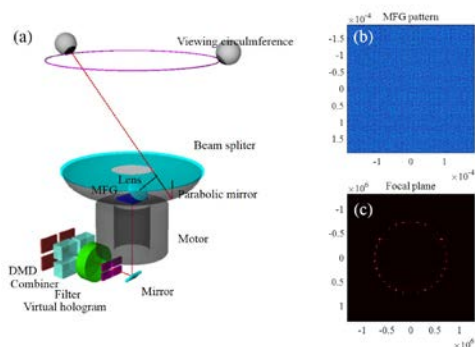


Fig. 1. (a) 360-degree holographic table top display system, and (b) MFG pattern, (c) results of simulation (point)

The system shown in Fig. 1(a) is designed for proposed system. Compared to the conventional system, the motor part is replaced with the MFG and filter. Figs. 1(b) and 1(c) show the designed MFG pattern and the simulation results.

The simulation is based on the hybridization of geometric optic and wave optic modeling techniques.

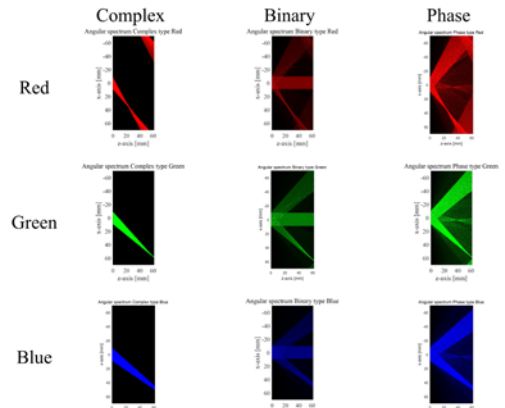


Fig. 2. Simulation result by R/G/B and MFG type

Fig 2 represents the simulation result based on the angular spectrum method. This result is the simulation for MFG of green standard. The MFG pitch is set to 200nm, red lambda is set to 633nm, green lambda is set to 532 and blue lambda is set to 473nm.

3. Conclusions

We demonstrate each component part of semi-mechanical table top system through the simulation. The ultimate goal of this research is the implementation of the non-mechanical table top system with the viewpoints to 1,024 viewpoints.

Acknowledgements

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References

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