Analysis of viewing property of transmission-type three-dimensional screen

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The projection-type display system has been used in various display field due to its adavantages such as the controllable resoultion and the large size of displayed screen. These advantages can be used as the same purpose in three-dimensional(3D) display system In previous research, the projection-type integral imaging system was proposed to expand the central depth plane in integral imaging [1]. That paper can resolve the imaging flipping problem using the elemental image compensation method. However, when the 3D image is observed without any devices, we cannot observe the clear 3D image because of the low diverging angle in the projection-type display system. Hence, to observe the clear 3D image, the 3D screen is needed

The research to enhance the 3D image visibility has been studied by many researcher. One of the solutions for enhancing the visibility is the optical depth converter which was proposed to solve the pseudoscopic problem in the integral imaging system [2]. So, the optical depth converter is called the 3D screen. However, the optical depth converter is restricted to resolve the image visibility because the flipping problem occurs inside the optical depth converter called as the 3D screen. In previous research, we propose that the micro hole-mirror array, which is the array of holes on a metal sheet, helps the flipping problems in the optical depth converter to reduce [3]. In this paper, we analysis the viewing property of the transmission-type 3D screen using the micro hole-mirror array.

Figure 1 shows the viewing property of transmission-type 3D screen. The proposed screen consists of two lens arrays and the micro hole-mirror array. In the micro hole-mirror arrays, the incident light is reflected by the inside mirror of the micro hole-mirror array and the reflected light is accumulated in one direction. Then, the light rays toward the neighboring lens is reduced by the micro hole-mirror array. Therefore, the proposed screen help to resolve the flipping problem generated inside the optical depth converter.

In this paper, we propose the transmission-type three-dimensional screen using the micro hole-mirror array and analyze the viewing property of the proposed screen. Also, we will verify the feasibility of the proposed screen by applying to the projection-type integral imaging system.

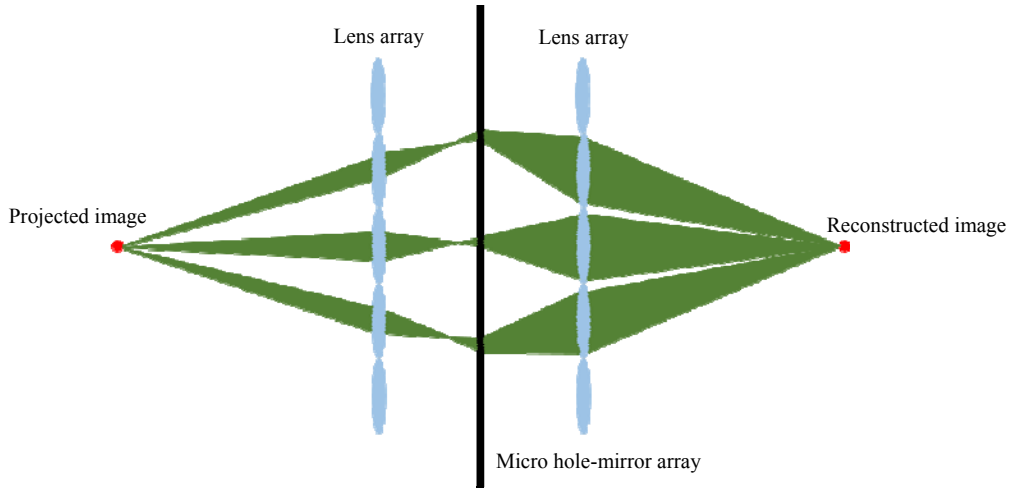

Fig. 1. The viewing property of transmission-type 3D screen using the micro hole-mirror array

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