

New Arc 3D display for changing various 3D images.

Shingo Nishiyama and Shiro Suyama

Dept. of Optical Science and Technology, Faculty Engineering, The University of Tokushima, 2-1 minamijosanjima, Tokushima 770-8506 Japan

Tel.:+81 88 656 9428, E-mail: u.t.s.nishiyama@gmail.com

The phenomenon which 3D image appears on the board is reported by Dr. Plummer [1]. This method has the advantages of simple structure and low set-up cost [2]. However, conventional arc 3D display cannot change the 3D image.

In this paper, we propose “Multi-image Arc 3D display” which can change various 3D images on one board.

Figure 1 shows conventional Arc 3D image example. Arc 3D image (Fig. 1(b)) is appeared by lighting the arc-shaped scratches (Fig.1(a)). Principle of Arc 3D display is shown in Fig. 2. In arc-shaped scratches, two specific bright points are observed on the arc-shaped scratch. Bright points are points of contact at which arc-shaped scratch and concentric circle with the center of crossed point between the straight line from eye to light source and board. The positions of bright points with the both eyes are different because left eye and right eye have the distance. People can be perceived depth by this parallax. Thus, one floating bright point can be observed for one arc-shaped scratch.

Principle of our new proposal method, “Multi-image arc 3D display”, is shown in Fig. 3. In conventional Arc 3D display, two sorts of many scratches are observed because of uniform illuminating. In Fig. 3(b), arc-shaped scratches for image A are illuminated by projector and another sort of scratches for image B aren't illuminated. This configuration provides observation of only image A.

Figure 4 shows experimental results of this proposal method. In conventional arc 3D display, two lines are observed. In Fig. 4(b) and (c), two images can be successfully changed between image A and image B.

Thus, our newly proposed method, “Multi-image arc 3D display”, can successfully change the various 3D images by using projector.

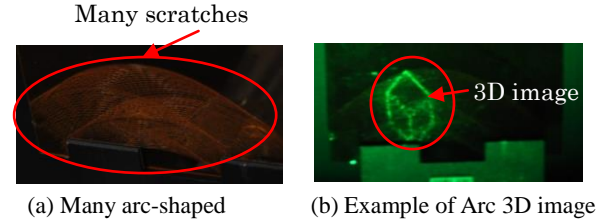


Fig. 1. Example of conventional Arc 3D display

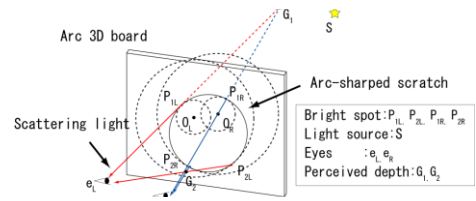


Fig. 2. Principle of Arc 3D display

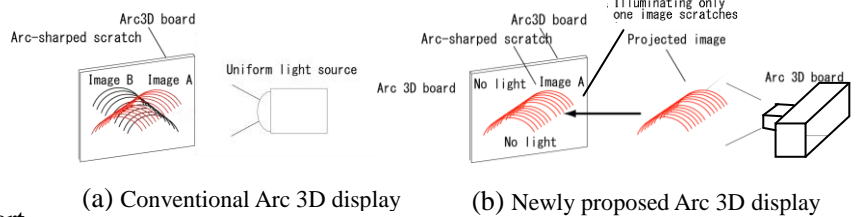


Fig. 3 Principle of our new proposal Arc 3D display

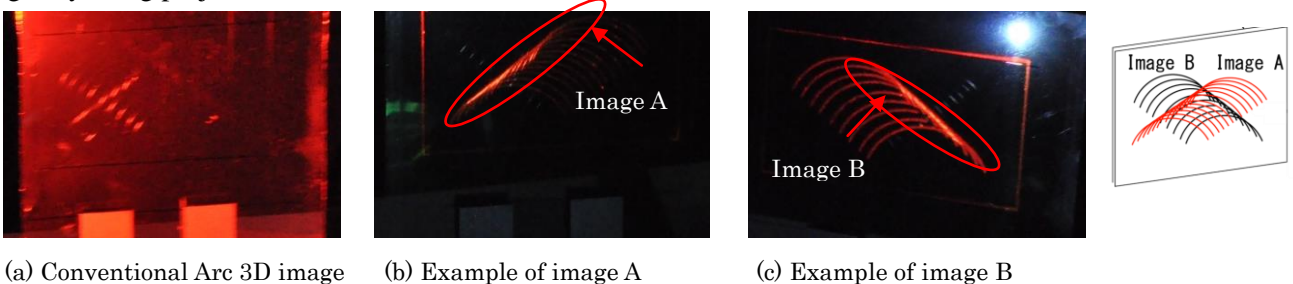


Fig.4 Photographs of multi-image Arc 3D display

References

- [1] W. T. Plummer and Leo R. Gardner: "A mechanically generated hologram?", Applied Optics, Vol31, pp. 6585-6588(1992).
- [2] M. Daibo, M. Kobayashi, S. Machida and M. Kimura: "Three-dimensional Display using Arc Shaped Fine Grooves", BULLETIN OF JSSD, Vol. 46, No. 1, pp. 19-26(1999).