Pseudo Simultaneous Emission LCD Technology

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In this paper, we propose the pseudo simultaneous emission(PSE) technology to reduce the crosstalk artifact of the time division stereoscopic 3-D display based on liquid crystal display. The conventional driving method of the temporal dividing 3-D is to insert the black image between left and right eye images as figure 1(left) shows. Using this technology, the crosstalk artifact occurs because the shutter glasses cannot divide two images ideally due to the slow LC response time. On the other hand, PSE technology put the black image gradually from top or bottom to bottom or top instead of frame by frame insertion as figure 1(right) shows. Then when considering the slow LC response, we can estimate the real luminance emission as bottom of figure 1(right). Consequently, the shutter glasses can divide two images completly since there is less left/right image's mix period in PSE driving.

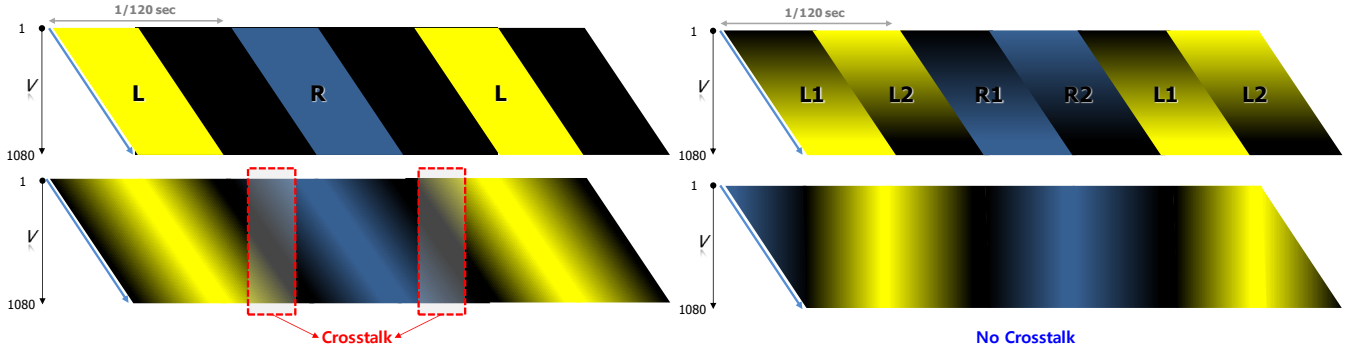

Fig. 1. Black insertion 240Hz 3D display(left) and PSE 3D display(right) driving technology

We evaluated the PSE technology with prototype 15" 240Hz LCD display. Active area of the LCD panel was vertically divided into five zones and we used the processed images in order to apply five different voltage sequences to each zone. Gray of the image was determined to minimize the total emission time and also to maximize the luminance of each zone. Left eye images (White, L1+L2) and right eye images (Black, R1+R2) were rolled on 240Hz LCD display and we measured the luminance profile of each zone. Figure 2 shows the result of the measurement. The emission time across the whole area of the PSE technology is shorter than the conventional black insertion method and also total luminance (magnitude) is higher than conventional method due to the pre-tilt mechanism of LC.

Through this experiment, we verified that the cognitive strength of crosstalk can be considerably improved using PSE driving technology and we discovered the potential of improvement of luminance of 3-D display.

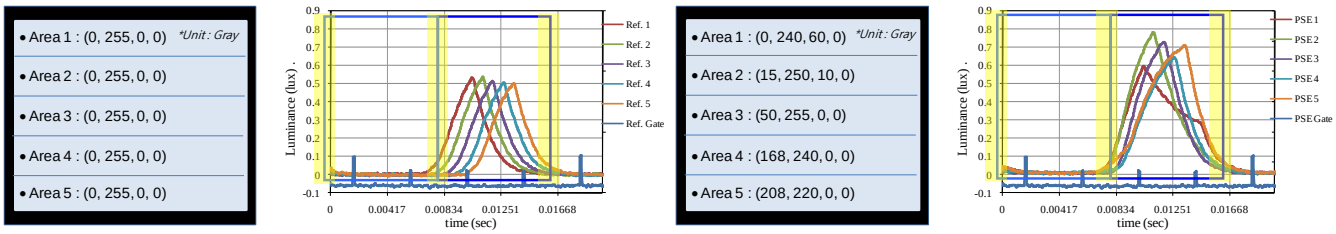

Fig. 2. Luminance profile of black insertion method (left) and PSE technology (right)

References

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