A Backlight Module for Blue Phase Liquid Crystal Display

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Blue phase liquid crystal displays may have better performance than conventional displays because they have microsecond response and need no surface alignment, but a vertical-field-switching blue phase liquid crystal display needs an oblique incident light source.

This research is primarily concerned with a new type backlight of edge lighting module. It can produce oblique light source by the microstructures of a light guide plate bottom surface.

The design concept of the whole system is depicted in Fig. 1. According to our previous work, we design the microstructures by the theory of inventive problem solving (TRIZ). As shown in Fig. 2, the vertex angle of the microstructures at light guide plate bottom surface is a combination of 45° and 15° which can redirect the light and lead the light into blue phase liquid crystal layer with large incident angle. Simulation results show the uniformity reaches 67% and the maximum value of the contrast ratio is 1,163, as shown in Fig. 3. This backlight module could be applied in the vertical-field-switching blue phase liquid crystal display.

Keywords: oblique light source, backlight module, TRIZ

Fig1. The backlight module system. BPLC: blue phase liquid crystal. LGP: light guide plate.

Fig2. The intensity distribution on the exist surface.

Fig3. Viewing angle characteristic expressed in contrast ratio.

References:

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