

FrenLCDs – displays on basis Fresnel lenses

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Abstract

Till now world-wide system of color selection is ones used matrix color filters (MCF). This system possesses many drawbacks.

Earlier we have offered system of formation of primary colors due to decomposition of white color on color components by means of active or passive diffractive gratings generated in each pixel – DLCD [1].

This type of displays removes many drawbacks inherent in well-known displays.

In the present work we offer one more type of displays in which formation of primary colors is carried out by means of active or passive phase Fresnel lenses (FL) [1-4]. We named this display as “FrenLCD”.

The formation of primary colors is made by nonswitchable or switchable phase Fresnel lenses.

It is known that system consisting of alternating transparent and opaque rings (amplitude Fresnel lens) radiuses, R_k , of which are chosen according to the expression: $R_k^2 = k \lambda f$, possesses the ability to collect light in the certain points of space lying on an optical axis, with waves of different lengths being focused in different axis points (in focuses of the different orders). FL forms system of focuses of different orders and can be done in the circular or cylindrical shape (FIGURE 1).

If the alternating rings differ not in transparency, but in value of refraction indices (phase FL), then at correctly chosen refraction indices there can be concentrated up to 85-95 % of total light energy in the first order focus. This property of phase FL is used for design of two versions of FrenLCDs. First of them is presented on FIGURE 2.

In second versions FL is formed of LC segments with initial orientation and LC segments reoriented owing to the applying of voltage

The detailed description of FrenLCDs design is resulted [2-3], problems of backlighting and opportunities of manufacturing in conditions of mass production are discussed. The working breadboard model of the first version is shown.

References

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2. *Pat. Russia* 2169349, 2169350 prior. 23.11.1998
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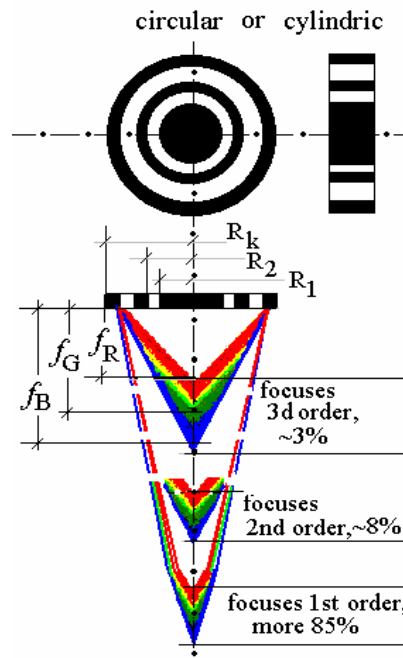


Figure 1. Rays path in circular or cylindrical lenses

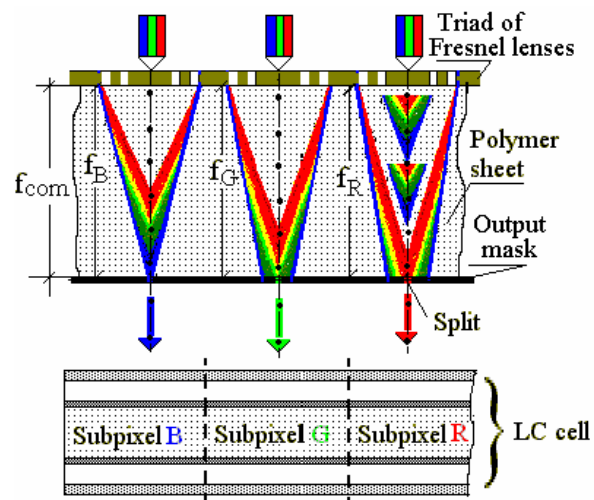


Figure 2. Design of the display and RGB matrix on the basis of passive Fresnel lenses