Liquid Crystal Cell with Two Command Surfaces

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We present the experimental results of investigation of nematic liquid crystals in the cell with two command surfaces. The LC cell (18μm of thickness) consisted of two glass plates covered by a film of sulfuric azo-dye SD1. Photoalignment technique was used to obtain a weak surface anchoring (1). Preliminary irradiation of the substrates by visible light from LED at 450 nm wavelength provides well defined planar boundary orientation. The influence of linearly polarized light on the cell filled by nematic 5CB resulted in rotation of the easy axis on the first substrate and so orientation changes from planar to twist nematic state by the given angle. The direction of surface orientation on the second surface wasn't changed due to presumable elliptic polarization of light passed through a liquid crystal layer. Such situation changed when electric field was applied orthogonally to the substrates plane. In this case liquid crystal molecules were oriented orthogonally to the substrates and the linear polarized light passed through such structure and produced the rotation of the easy axis on the second substrate. The images of the cell with one pixel which are shown in figure 1 confirm such mechanism. So such procedure provides rotation of monodomain planar sample on the given angle, which can be used at investigation of anisotropic properties of LCs.

a b c

Figure 1. The digital images of the cell at different stage of experiment (1,2-direction of NLC molecules on the first and second substrates respectively): a) initial planar orientation (polarizers are crossed); b) electric field applied to the pixel (polarizers are crossed); c) after application of electric field and polarized light (parallel polarizers).

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References

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