Optical Response of a Twist Indicator in Case of Two-Dimensional Elastic Deformation of a Liquid Crystal Caused by an Electric Field, Depending on the Physical and Structural Parameters of the Device

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Abstract

A unique algorithm and software for calculating two-dimensional elastic deformation of a LC in an electric field was developed. A computer simulation method was used to study two-dimensional elastic deformation of a LC in an electric field, depending on the physical and design parameters of the LC cell. The presence of various regions of LC deformation in case of two-dimensional deformation is shown, and the effect of the physical and structural parameters of the LC cell on the size of these regions is determined. It is shown that the ratio of the electrode size to the thickness of the LC layer has the greatest influence on the size of the regions of two-dimensional LC deformation. Of all the LC physical parameters it is the dielectric anisotropy of a LC material that has the greatest influence on LC two-dimensional deformation. The minimum size of a display element of a twist indicator was calculated depending on the physical and structural parameters.

Keywords: elastic deformation, liquid crystal, dielectric anisotropy.

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Access full text (in Russian)

References

The modification of the solutions of the diffusion equations for the vortex motion by allowance for pinning are considered. The phase transition, meaning the melting of the vortex lattice, was detected by the change of the transformer response when the temperature was raised. The vortex-lattice melting temperatures were measured in superconducting films of various thicknesses. At the same time, depending on the response of the system to weak external action, one can speak of the existence of a topological long-wave order that is preserved under continuous and mutually unique mappings of the system. At low temperatures the vortex lattice should preserve an elastic response to an external action also in two dimensional systems. We begin with the electric displacement vector $\mathbf{D}$ where $i, j = x', y', z'$ are Cartesian coordinates and the summation over repeated indices is inferred. The tensor of dielectric permittivity... Van Doorn, C.Z.: Transient behaviour of a twisted nematic liquid-crystal layer in an electric field. J. Physics (Paris), 36, Colloq. C1, 261â€“263 (1975).Google Scholar. 23. Schadt, M., Helfrich, W.: Voltage dependent optical activity of a twisted nematic liquid crystals. Appl. Phys. Numerous techniques for the demonstration of such devices have been reported thus far. Moving beyond traditional solutions, several new approaches have been proposed in recent years based on the use of liquid crystals, which can have a great impact in emerging applications. This work focuses on the recent advances in liquid crystal lenses with diameters larger than 1 mm. The LSPR properties can be modified by the presence of an analyte, as in the case of plasmon-based biosensors [ 32 ], or by an active medium, such as LCs [ 33 ]. When instead of isolated metallic nanoparticles a continuous metal film interacts with light, propagating waves can emerge, known as Surface Plasmon Polaritons (SPP), which provide deep subwavelength confinement. The hybrid nature and soft lattice of organolead halide perovskites render their structural changes and optical properties susceptible to external driving forces such as temperature and pressure, remarkably different from conventional semiconductors. Here, we investigate the pressure-induced optical response of a typical two-dimensional perovskite crystal, phenylethylamine lead iodide. However, in 3D cases such as MAPbX$_3$ and FAPbX$_3$, smaller molecules (methylammonium and formamidinium) occupy vacancies among the octahedral [PbX$_3$]$^-$ frame. When hydrostatic pressure is applied to organolead halide perovskites, both components contribute to the lattice structure change, leading to complicated structures and properties.