Design and fabrication methods of HAN cells with arbitrary LC pretilt angle value are described. Phase retardation $\Delta \Phi$ values for the hybrid LC vs the LC pretilt angles $\theta_0^{(1)}$, $\theta_0^{(2)}$ on the opposite cell’s substrates are calculated for arbitrary light incidence angle (Fig.1). A phase difference parameter $\Phi=\Delta \Phi/\Delta \Phi_{\text{max}}$ was introduced in [1,2]. The phase retardation difference $\Delta \Phi$ is reduced to its maximum value $\Delta \Phi_{\text{max}}=2\pi \Delta n L/\lambda$, $\Delta n=n_e-n_o$ is the LC birefringence.

A few samples of the HAN cells with two types of the LC alignment have been assembled with preassigned pretilt angle on one substrate (Fig.2). The pretilt angle on another substrate coated with an organosilicon film has been determined by using our simulation.

LC director configuration is suggested for its application in optical compensators. LC pretilt angle value is measured in the HAN cells with given planar or vertical LC alignment on one of the substrates.

Fig. 1. Simulated $\Phi(\theta_0^{(1)}, \theta_0^{(2)})$ dependences for the case of Hyb90° cells. $n_e=1.7$ and $n_o=1.5$. Incidence angle $\beta$ 45°. Left: $\Phi$ behaviour at simultaneous variation of both $\theta_0^{(1)}$ and $\theta_0^{(2)}$. Right: $\Phi(\theta_0^{(1)})$ dependences at fixed $\theta_0^{(2)}$ value. Center: view from top onto the surface presented in the left.

Fig. 2. The cells’ structure and scheme of the pretilt angle determination.

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References

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