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Interference investigations of liquid crystal-polymer composites structure

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Abstract

The methods of correlation optics are for the first time applied to study the structure of liquid crystal-polymer (LC-P) composites. Their phase correlation function (PCF) was obtained considering LC-P composite as a random phase screen. The amplitude of PCF contains information about the number of LC domains and structure of LC director inside of them, while a half-width of this function is connected with the size of these domains. In good agreement with previous studies by SEM technique we detected a monotone decrease of LC domains with polymer concentration. When applying the electric field, for the samples with $\varphi_p > 35$ vol.% (PDLC morphology), the amplitude of PCF is monotonic. On the contrary, if $\varphi_p < 35$ vol.% (PNLC morphology) the amplitude of PCF is non-monotonic and, depending on the applied voltage, goes through maximum.



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