

Research of frequency-modulation characteristics of liquid-crystal modulator

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Liquid-crystal materials are perspective ones for construction of the various devices and apparatus used in optoelectronics, including modulators laser radiation. The research of frequency-modulation descriptions on the temperature of liquid-crystal were conducted in order to achieve the maximal effect of its use for modulation of laser radiation. A modulator is the cell as "sandwich", filled by a liquid-crystal mixture. The liquid-crystal mixtures of the induced cholesterics on the basis of nematic matrix of CZK-1 with low concentration of optically active admixture of WIXN-3 (from 0,5 to 2 weight %) were used in our research.

Analysing the dependence of frequency-modulation descriptions on a temperature of these mixtures, it is possible to get the dependence of modulation-depth on concentration of active admixture in liquid-crystal: the greater concentration of optically active admixture in a liquid-crystal mixture the higher value depth of modulation.

For all type of liquid-crystal mixtures there is the precisely expressed maximum of value of modulation-depth in the low frequencies (up to 5 Hz) region for almost in all temperature interval (293 - 323K). However at a temperature of 313 K is for CZK1 (0,5 Bar. %) the minimum of modulation-depths on frequency 5 Hz is observed and for the mixture of CZK1 (1,5 Bar. %) at a temperature 313 K the maximum of modulation-depth in considerably more wide frequency is observed.

For mixtures with concentration up to 1,0 weight % the increase of modulation-depth is observed at frequency of 10 Hz, and for mixtures with concentration of optically active admixture of 1,5 weight % and 2 weight % is observed at frequency 30 of Hz. Such difference might be accounted for such the existence of different optimum conditions needed for the untwisting of cholesteric spirals of nemato-cholesteric mixtures.