Calculation of the transmission and reflection coefficients of the light falling on the cholesteric liquid crystals

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Abstract: In this paper we study some aspects of optical phenomena occurring in liquid crystals. Especially, we calculate the transmission and reflection coefficients of the light falling on the considered optical system, i.e. a cholesteric liquid crystal bounded by two semi-infinite isotropic materials. For this purpose, we used own computer program, which realises the so-called 4x4 matrix method. As a result of the numerical investigations, we present some interesting curves of the reflection/transmission coefficients as a function of different parameters of the considered system. The main advantage of the applied technique is taking into account all four elementary waves of the light and their interferences in each elementary layer of the liquid crystal. The inclusion of both the incoming and reflected waves is of particular importance for cholesteric crystals, where, due to a periodic structure, the light wave interferences have significant influence on the intensity of the reflected light and the light passing through the considered optical system.

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