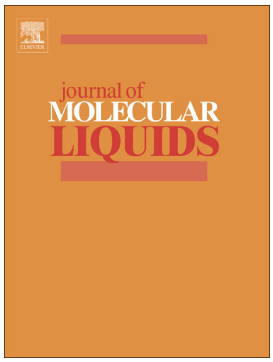

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Dynamics of pitch change in chiral azobenzene-doped liquid crystals

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Abstract

Dynamics of pitch change in chiral azobenzene-doped liquid crystals (CAdLCs) has been investigated. Theoretically, the pitch change in CAdLCs is discontinuous. Completed behavior of the discontinuous pitch jump in a fixed thickness cell is analyzed based on the calibration term, which is a key length parameter of the gradually increasing elastic potential energy with time, according to Hooke's law. At a specific time, the energy reaches maximum value and then releases to provide a compressed/extended force to discontinuously change pitch to minimize the energy of the whole system. At other times, the compressed/extended force disturbs the uniformity of planar texture if the surface anchoring energy is weak. Discontinuous pitch jump can be observed in CAdLCs with a few turns of helix. Thus, a novel method to evaluate the pitch of CAdLCs with only two turns of the helix after UV illumination is feasible. In contrast, discontinuous pitch jump in the previous work is hard to be noticed if CAdLCs has a large number of turns of helix. The behavior of pitch change in CAdLCs on the bases of the number of turns of helix and the cell thickness will be discussed in detail.

Keywords: liquid crystals; azobenzene; chiral dopant; cholesterics

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