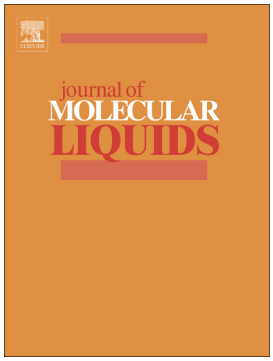

Oscillations of the orientational structure of a ferronematic liquid crystal in an elliptically polarized rotating magnetic field

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Oscillations of the orientational structure of a ferronematic liquid crystal in an elliptically polarized rotating magnetic field

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In the framework of the continuum approach we study the behavior of the orientational structure of a ferronematic liquid crystal with soft planar coupling between the liquid crystal matrix and magnetic particles in an elliptically polarized rotating magnetic field. We reveal synchronous and asynchronous oscillating regimes of orientational structure rotation for unbounded sample. We obtain the dependence of the critical angular velocity, which determines the boundary of regimes, on suspension parameters and the magnetic field for different values of its ellipticity. We show that transitions between the regimes are induced by the change in the coupling energy, the ellipticity parameter, the angular velocity, and the magnetic field. We find out that the critical angular velocity of an elliptically polarized magnetic field is always less than the critical velocity of a circularly polarized field. We analyze the stability thresholds of the orientational rotation regimes of a ferronematic liquid crystal and a nematic without magnetic admixture depending on the ellipticity of the magnetic field. We show that the presence of the magnetic particles increases the stability threshold of a synchronous oscillating regime of the suspension rotation.

Key words: ferronematic; liquid crystal; rotating magnetic field; elliptical polarization