Abstract Submitted
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Free energy power expansion for orientationally ordered phases: energy and entropy[1] SERGIJ SHIYANOVSKII, Liquid Crystal Institute, Kent State University — We propose a new approach for description of orientational phase transitions that utilizes the following specific features of the orientational energy E and entropy S: (a) S possesses an additional symmetry in comparison with E, being invariant under rotation of the molecular frame; and (b) E contributes only to the second order terms because the pair molecular interaction is dominant. The approach is based on minimization of the scaled orientational free energy $\bar{F} = F/T = E/T - S$ instead of F because $\bar{F}$ obeys the standard assumption of the Landau theory that only the second order terms are temperature dependent. We apply the approach to build a model for nematic phases in materials with non-polar parallelepiped-type molecules with symmetry D_{2h}. The presented model introduces complex OPs, generalizes the Landau-de Gennes (LdeG) theory and predicts the existence of a biaxial nematic phase for the forth order expansion of $\bar{F}$.

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