replacing MAR17-2016-001312.

Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

A static elastic theory for usual, chiral, and twist-bend nematic liquid crystals orderings LUIZ ROBERTO EVANGELISTA, MICHELY P ROSSETO, Universidade Estadual de Maringá, ROBERTA RARUMY RIBEIRO DE ALMEIDA, RAFAEL SOARES ZOLA, Universidade Tecnológica Federal do Paraná, GIOVANNI BARBERO, Politecnico di Torino, IOANNIS LELIDIS, University of Athens — To describe the elastic properties of the twist-bend nematic (N_{TB}) phase, a continuum description is proposed to tackle the orientational properties of the nematic, cholesteric, and twist-bend nematic phase. The elastic energy density is an extension of the usual Frank elastic energy density, by including an extra element of symmetry represented by the axis **t**, allowing periodic distortions. This general energy density indicates the stability of at least three phases allowed by the elements of symmetry and can be faced as a framework to study the static distortion in the nematic ordering. The study of order transitions reveals a periodically modulated structure which appears as a ground state, exhibiting a twist-bend molecular organization. Similar arguments demonstrate that the nematic twist-bend N_{TB} phase is indeed a heliconical structure. It is possible to show analytically that the pitch of this structure is in the nanometric range, in agreement with experimental observations.

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Date submitted: 13 Nov 2016 Electronic form version 1.4