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Dynamics of coreless defects during winding up transitions in confined chiral nematic liquid crystals

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Abstract: Twist-coupled elastic deformations are ubiquitous and in the limelight of interest for next-generation self-shaping materials. In this work we describe how twist dynamics under fixed anchoring lead to bend deformation and defects dynamics in a field unwound chiral liquid crystal material. We use the Q-tensor dynamics under the Landau-de Gennes formalism in a finite element mesh to explore the texture pathways from the unwound (homeotropic) to the helical planar structure. Our simulations describe well previously reported experiments and confirm that the process occurs by forming pairs of coreless defects that interact with each other and create quadrupolar structures called Lehman clusters. The dynamics and coarsening of dipoles and quadrupoles of defects are described. This is the first numerical study describing the full dynamics, which has been sought for several years.

Key-words: Transient Planar Transition, Cholesteric Liquid Crystals, Landau-de Gennes Formalism
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References:

[1] M. Yu, X. Zhou, J. Jiang, H. Yang, and D.-K. Yang, Soft Matter 12, 4483 (2016).
[2] Y.-C. Yang, R. S. Zola, Y. Cui, D.-K. Yang, H.-Y. Chen, C.-C. Hsu, C.-J. Chen, and C.-C. Liang, SID Symposium Digest of Technical Papers 42, 400 (2011).
[3] E. K. Omori, R. F. de Souza, A. Jakli, R. T. de Souza and R. S. Zola, Submitted, (2022).