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Fine structure of the topological defect core: Disclination in lyotropic chromonic liquid crystal[1] SHUANG ZHOU, SERGIJ SHIYANOVSKII, HEUNG-SHIK PARK, YOUNG-KI KIM[2], Liquid crystal institute, Kent State University, Kent, Ohio 44242, USA, TRISTAN HEARN, LOTHAR REICHEL, Department of Mathematical Science, Kent State University, Kent, Ohio 44242, USA, OLEG LAVRENTOVICH, Liquid crystal institute, Kent State University, Kent, Ohio 44242, USA — Topological defects represent an important concept in many branches of modern physics ranging from cosmology and optics to hard and soft matter. One of the most difficult problems is the fine structure of the so-called core region of defects, where the deformations of the order parameter are so strong that the phenomenological description valid in the far field becomes invalid. Experimental exploration of the fine core structure is usually hindered by the small size (atomic/molecular level) of the core, where optical or even electron microscopy techniques are invalid. In this work, we take advantage of the peculiar nature of the so-called lyotropic chromonic liquid crystals (LCLC) of a nematic type that carry disclinations with a core extending over macroscopic distances (tens of micrometers), large enough to explore their spatial variation by optical and electron microscopy. We demonstrate that the director and the scalar order parameter (associated with the degree of orientational order) show a profound change in the core region. In particular, as one approaches the center of the defect, the azimuthal dependency of the director field changes dramatically and the scalar order parameter shows a strong dependence on the strength of splay and bend deformations.

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