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Topological Defects in Liquid Crystal Films

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Abstract: A topological theory of liquid crystal films in the presence of defects is developed based on the φ-mapping topological current theory. By generalizing the free-energy density in "one-constant" approximation, a covariant free-energy density is obtained, from which the U(1) gauge field and the unified topological current for monopoles and strings in liquid crystals are derived. The inner topological structure of these topological defects is characterized by the winding numbers of φ-mapping.

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Key words: director field, free-energy density, topological current, topological defects, winding number

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