

Dynamics of Soft Crystals and Defects

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The dynamic pattern formation is ubiquitous in nature. The patterns often appear as spatially ordered states, which consist of patches of various shapes. These are associated with local symmetry left after breaking rotational symmetry. In this presentation, we try to show our recent effort to understand defect dynamics of crystals described as dynamics of patterns created by phenomenological nonlinear partial differential equations (PDE). We call it as *soft* crystals.

Such *soft* crystals may have rotational defects (disclination) as well as translational defects (dislocation), which are of relevance for macroscopic properties of materials. The classification of these defects has a long history and it is relatively well understood what kind of defects appears depending on the local symmetry. Compared with the static structure, dynamics of defects is less well understood. In order to tackle this problem, we use the phase-field-crystal-type PDEs and analyze their motion and deformation under nonequilibrium states.

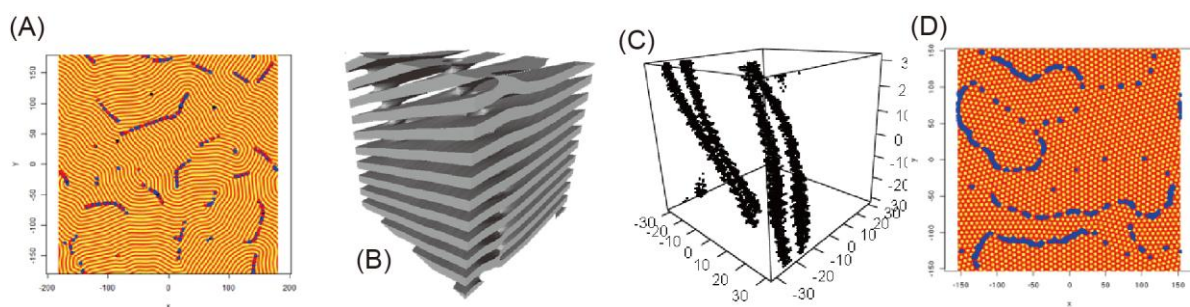


Fig. 1. (A) Lamellar and (D) hexagonal patterns in two dimensions. Topological defects (dislocations and disclinations) are also shown. (B) A lamellar pattern in three dimensions with screw dislocation line extracted (C).

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Fields of Research

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