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COUNT AND SYMMETRY OF GLOBAL AND LOCAL MINIMIZERS OF THE CAHN-HILLIARD ENERGY OVER CYLINDRICAL DOMAINS.

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We address the problem of minimization of the Cahn-Hilliard energy functional under a mass constraint over two and three-dimensional cylindrical domains. Although existence is presented for a general case the focus is mainly on rectangles, parallelepipeds and circular cylinders. According to the symmetry of the domain the exact number of global and local minimizers are given as well as their geometric profile and interface location; all are one-dimensional increasing/decreasing and odd functions for domains with lateral symmetry in all axes and also for circular cylinders. The selection of global minimizers by the energy functional is made via the smallest interface area criterion.

The approach utilizes $\Gamma-$convergence techniques to prove existence of an one-parameter family of local minimizers of the energy functional for any cylindrical domain. The exact number of global and local minimizers as well as their geometric profiles are accomplished via suitable applications of the unique continuation principle while exploring the domain geometry in each case and also the preservation of global minimizers through the process of $\Gamma-$convergence.

References

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