

Initiating Phase Separation: Reaction-Driven Solutions in Cahn–Hilliard Equations

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In this talk, we investigate local and nonlocal Cahn–Hilliard equations with source terms, constant mobility and singular potentials, such as the Flory–Huggins potential. Our main objective is to demonstrate that the presence of a specific class of reaction terms allows the establishment of weak solutions to the corresponding initial and boundary value problem when the initial condition is a pure phase. Notably, our findings extend to both the local and nonlocal variants of the Cahn–Hilliard–Oono and Cahn–Hilliard–Bertozzi models. To establish these results, a methodical approach is used that encompasses systematic approximation, preliminary estimates, qualitative analysis, and energy considerations.