Approximate Slow Manifolds and Interface Motion for Stochastic PDEs

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Abstract

We consider stochastic partial differential equations like the Cahn-Hilliard or Allen-Cahn equation perturbed by additive noise, and study the dynamics of interfaces or droplets for theses stochastic models.
For small noise the dynamics of the stochastic infinite dimensional system is given by the motion along a deterministic finite dimensional deterministic slow manifold M parametrized by the interface or droplet positions. The manifold describes the motion well for very long time-scales until an interface breaks down or the droplets merge.

Main results presented include stochastic stability and attractivity for the manifold M and the derivation of an effective equation for the positions of interfaces or droplets.

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[2] *D. Antonopoulou, P. Bates, D. Blömker, G. Karali*: Motion of a droplet for the mass-conserving stochastic Allen-Cahn equation. Preprint, 2015.

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