SPDEs near a change of stability[*]

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Abstract

As an example we consider the Swift-Hohenberg equation on a large (but still bounded) domain near its change of stability. This equation is a toy model for the convective instability in the Rayleigh-Bénard model.

It is well known that sufficiently close to the bifurcation, solutions are approximated by a dominating periodic pattern. But on sufficiently large domains this pattern is modulated by solutions of a Ginzburg-Landau equation.

We discuss the influence of noise given by thermal fluctuations on the approximation, and give rigorous error estimates in the stochastic case. This approximation also extends to long time behaviour given by invariant measures, and has applications in pattern formation below the threshold of instability..

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[*]oral communication.