

## On the extended Allen-Cahn equation

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Nonlinear fourth-order PDEs usually have a richer and more complex set of solutions when compared to its second-order counterpart. In this sense, many models exhibit behaviors that could be better described with fourth-order equations, like ocean and atmosphere dynamics, bridges, and pattern formation, just to mention some of them. The theory for higher-order nonlinear problems, however, is far less developed than its second-order analogue and many basic questions remain open. Lack of maximum principles, oscillatory behavior of solutions, and regularity issues are some of the main difficulties in the study of such problems.

In this talk I consider a fourth-order extension of the Allen-Cahn model with mixed-diffusion and Navier boundary conditions. I present results on existence, uniqueness, positivity, stability, a priori estimates, and symmetry. As an application, we construct a saddle solution in the whole space. The proofs rely on variational and bifurcation methods. Some numerical approximations of solutions will also be discussed.

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