



Lehrstuhl für Analysis und Modellierung

**Lehrstuhl-Seminar
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**Defects in bilayer interfaces in the
multi-component functionalised Cahn-
Hilliard equation**

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Abstract: We study a multi-component extension of the functionalised Cahn-Hilliard (fCH) equation, which provides a framework for the formation of patterns in fluid systems with multiple amphiphilic molecules. The assumption of a length scale dichotomy between two amphiphilic molecules allows the application of geometric techniques for the analysis of patterns in singularly perturbed reaction-diffusion systems. For a generic two-component system, we show that solutions to the four-dimensional connection problem provide the leading order approximation for solutions to the full eight-dimensional barrier problem, which can be obtained through a perturbative expansion in the layer width. Moreover, we show that a saddle-node bifurcation of bilayer solutions in the four-dimensional connection problem acts as a source of so-called defect solutions, i.e. solutions to the barrier problem that are not also solutions to the connection problem. The analysis combines geometric singular perturbation theory with centre manifold theory in an infinite-dimensional context.