

Seminar of the Work Group
Nonlinear Partial Differential Equations
SS 26

July 22th, 2026, 11:30 - 13:00
Seminar room: SR 3.069

Planar Fronts on the Whole Space: Stability and Effective Motion

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Abstract

We study nonlinear stability of planar traveling fronts in reaction-diffusion systems on $\mathbb{R}^d$ with $d \geq 2$ against nonlocalized (i.e., L^∞) perturbations. Under natural spectral stability assumptions, we prove that the motion of the interface is governed by a viscous Hamilton-Jacobi equation to leading order. This allows us to deduce that planar fronts are Lyapunov stable but not asymptotically stable, and may oscillate indefinitely in space and time. The nonlocalized perturbations present challenges both at the linear and nonlinear level, which we overcome by innovating on recent techniques introduced for the study of (one-dimensional) periodic wave trains.

This is joint work with Björn de Rijk (KIT).