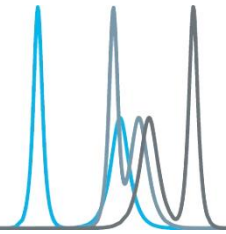

Lehrstuhl für Analysis und Modellierung

Lehrstuhl-Seminar
Sommersemester
2021

Dr. Milen Ivanov

Brown University, Rhode Island

Truncation of Contact Defects in Reaction-Diffusion Systems

8. Juli 2021 - 16:00
WebEx Meeting

Abstract: Solutions of reaction-diffusion systems exhibit a wide variety of patterns like spirals, stripes and Turing patterns. In particular, the Belousov-Zhabotinsky (BZ) reaction produces spiral patterns, which may undergo a period-doubling bifurcation; then a line defect is emitted from the center of the spiral and along it the pattern jumps half a period. In order to study this phenomenon, we consider the so-called contact defects, studied by Sandstede and Scheel: time-periodic functions ud(x,t), which converge (in an appropriate sense) to a periodic function as $x \to \pm\infty$. Of interest is the problem of truncating such a defect to a large interval, with Neumann or periodic boundary conditions.

In a finite-dimensional model, obtained via Galerkin approximation, we prove the existence and uniqueness of such a truncated contact defect. Furthermore, we prove this contact defect is spectrally stable when given periodic boundary conditions, and spectrally unstable with Neumann boundary conditions.

These results suggest that the observed spiral patterns with line defects are stable. A problem for future work is to extend these results to the infinite-dimensional setting.

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