Global stabilization of solutions to the complex Ginzburg-Landau equation by finite parameter controllers

Jamila Kalantarova
in collaboration with T. Özsarı

Abstract

This talk concerns the initial boundary value problem for the complex Ginzburg-Landau equation:

$$u_t - (\lambda + i\alpha)\Delta u + (\kappa + i\beta)|u|^p u - \gamma u = \Pi(u), \quad x \in \Omega, t > 0,$$

where u denotes the complex oscillation amplitude, $\beta \in \mathbb{R}$ and $\alpha \in \mathbb{R}$ are the (nonlinear) frequency and (linear) dispersion parameters, respectively. The constants λ and κ are assumed to be strictly positive. $\Omega \subset \mathbb{R}^n$ is a bounded domain and $p > 0$ is the source-power index. The operator Π at the right hand side denotes a finite parameter feedback controler, which employ finitely many volume elements, Fourier modes or nodal observables. We prove the global exponential stabilization of this problem. Moreover, steering solutions of the Ginzburg-Landau equation to a desired solution of the non-controlled system employing finite parameter controllers is established.

Both researchers in this work were supported by TÜBİTAK 3501 Career Grant 115F055