

# Null-controllability of cascade reaction-diffusion systems with odd coupling terms

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## Abstract

In this talk, we consider a nonlinear system of two parabolic equations, with a distributed control in the first equation and an odd coupling term in the second one. This type of system naturally appears from the modeling of chemical reactions. We prove that the nonlinear system is small-time locally null-controllable even if the linearized system is not null-controllable. The proof relies on three main steps. First, we obtain from the classical L2 parabolic Carleman estimate, conjugated with maximal regularity results, a weighted Lp observability inequality for the nonhomogeneous heat equation. Secondly, we perform a duality argument, close to the well-known Hilbert Uniqueness Method in a reflexive Banach setting, to prove that the heat equation perturbed by a source term is null-controllable thanks to odd controls. Finally, the nonlinearity is handled with a Schauder fixed-point argument. This is a joint work with Takeo Takahashi (Inria Nancy).