Optimal and Feedback Control of Some Reaction-Diffusion Equations

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Abstract

The optimal control of some systems of nonlinear reaction-diffusion equations is considered including the Nagumo and FitzHugh-Nagumo equations. These equations are known to develop traveling wave fronts, spiral waves or scroll rings as solutions. Well-posedness of the system, differentiability of the control-to-state mapping, and optimality conditions of first order are briefly sketched. In particular, the case of sparse optimal control is addressed. Moreover, the optimization of time-delays in local and nonlocal Pyragas type feedback control up to the control by measures is discussed. Various numerical examples illustrate the great diversity of geometrical patterns and their control.