Control of spatiotemporal patterns in the Gray-Scott model

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Various real-life systems exhibit complex dynamical regimes, including spatial patterns and spatiotemporal chaos. An important issue is the possibility of attaining a desired state by means of some external influence on the system. Time-delayed feedback uses the difference between current state of the system and its state some time ago to provide an efficient tool to control systems dynamics. Using hte Gray-Scott model we show that in the case of spatiotemporal chaos, the control can either stabilize uniform steady states or lead to bistability between a trivial steady state and a propagating travelling wave. Furthermore, when the basic state is a stable travelling pulse, the control is able to advance stationary Turing patterns or yield the above-mentioned bistability regime. I will discuss how in each case the stability boundary can be found in the parameter space of the control strength and the time delay, and will also show numerical simulations which suggest that diagonal control fails to control the spatiotemporal chaos [1].

1. Y.N. Kyrychko, K.B. Blyuss, S.J. Hogan and E. Schöll, *Chaos*, **19**, 043126 (2009).