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Controlling the position of traveling fronts JAKOB LÖBER, HARALD ENGEL, ECKEHARD SCHÖLL, Institute for Theoretical Physics, TU Berlin — We present a method to control the position as a function of time of a one-dimensional traveling front solution of a one-component reaction-diffusion system according to a specified protocol of movement. Given this protocol, the control function is found as the solution of a perturbatively derived integral equation. Two cases are considered. First, we derive an analytical expression for the space (x) and time (t) dependent control function $f(x,t)$ valid for arbitrary protocols and arbitrary bistable reaction kinetics. These results for the control agree well with results of an optimal control algorithm. Second, for stationary control the integral equation reduces to a Fredholm integral equation of the first kind. For the Schlögl model, we present an analytical solution of the problem to stop a front at a specified position. All analytical results are in good agreement with numerical simulations of the underlying reaction-diffusion equations. Extensions to two spatial dimensions and other equations supporting traveling wave solutions are considered.

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