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Shadowing and perturbation of attractors in discretized parabolic equations

Let $S(t)$ be the semigroup in $H_0^1(0,1)$ generated by a parabolic equation

$$u_t = u_{xx} + f(u), \quad u \in \mathbf{R}, \quad x \in [0,1],$$

with the Dirichlet boundary conditions. Assume that all fixed points of $S(t)$ are hyperbolic. It is shown that in this case approximate trajectories given by a semiimplicit discretization with space step d and time step h are shadowed by exact trajectories on unbounded time intervals with accuracy $L(d+h)$, where L is an absolute constant. Hausdorff distances between "exact" and "discretized" global attractors are estimated. Part of these results is joint work with S. Larsson.