**Brunovský, P.**; **Fiedler, B.**

**Connecting orbits in scalar reaction diffusion equations.** (English) Zbl 0679.35047

Dyn. Rep. 1, 57-89 (1988).

[For the entire collection see Zbl 0651.00018.]

This paper is devoted to the study of the flow of a one-dimensional reaction diffusion equation

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

with Dirichlet boundary conditions

$$(2) \quad u(t,0) = u(t,1) = 0.$$

Let v, w denote stationary, i.e. t-independent solutions. Then v connects to w, if there exists an orbit u(t,x) of (1)-(2) such that

$$(3) \quad \lim_{t\to-\infty} u(t,.) = v, \quad \lim_{t\to+\infty} u(t,.) = w,$$

i.e. u(t,.) is a heteroclinic orbit connecting v to w. The question: Given v, which stationary solutions w do connect to v is considered in the paper and answered using homotopy theory. The results are then compared with earlier work of Henry and of Conley and Smoller. The case of Neumann boundary conditions is also shortly sketched and the paper ends with interesting conjectures and open questions.

Reviewer: J.Mawhin

**MSC:**

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|---|---|---|
| 35K57 | Reaction-diffusion equations | Cited in **1** Review |
| 35K60 | Nonlinear initial, boundary and initial-boundary value problems for linear parabolic equations | Cited in **39** Documents |

**Keywords:**

reaction-diffusion equation; connecting orbits; Dirichlet boundary conditions; homotopy theory; Neumann boundary conditions