
QUASILINEAR REACTION-DIFFUSION EQUATION WITH DISCONTINUOUS DIFFUSIVITY AND BISTABLE REACTION TERM

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joint work with Pavel Drábek (University of West Bohemia, Pilsen, Czech Republic)

We study the existence and properties of travelling wave solutions of the reaction-diffusion equation

$$\frac{\partial u}{\partial t} = \frac{\partial}{\partial x} \left(d(u) \left| \frac{\partial u}{\partial x} \right|^{p-2} \frac{\partial u}{\partial x} \right) + g(u), \quad (x, t) \in \mathbb{R} \times [0, +\infty) \quad (1)$$

with $p > 1$ and a continuous bistable reaction term g . The diffusion coefficient d is only piecewise continuous and allows for degenerations as well as singularities near 0 and 1.

Our approach is based on the investigation of an equivalent first order problem and provides a broad theoretical background for mathematical treatment of various phenomena in population dynamics, chemistry and physics. We prove the existence of a unique speed of propagation such that (1) possesses a travelling wave solution which is a non-smooth function in general and unique up to translation. Assuming power-type behaviour of the reaction and diffusion term near equilibria, we also discuss asymptotic behaviour of the profile.

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