

Traveling Waves in Reaction-Diffusion-Convection Problems with p -Laplacian-Type Diffusion

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Abstract

We study the existence and properties of traveling fronts for the equation

$$v_t + h(v)v_x = [D(v)|v_x|^{p-2}v_x]_x + g(v), \quad x \in \mathbb{R}, t \geq 0,$$

with $p > 1$. The diffusion coefficient $D = D(u)$ is assumed to be strictly positive in $(0, 1)$ with possible degenerations or singularities at one or both endpoints. We consider three types of nonlinear reaction terms g , commonly referred to as types A, B, and C. We present sufficient conditions for the existence and non-existence of continuous, possibly non-smooth wave profiles defined on the whole real line. Our approach is based on comparison arguments for an equivalent non-Lipschitz first-order ODE on a bounded interval.

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