

Travelling waves for Fisher–Kolmogorov equation with discontinuous diffusion

Michaela Zahradníková

Department of Mathematics, Faculty of Applied Sciences
University of West Bohemia in Pilsen
Czech Republic
e-mail: mzahrad@kma.zcu.cz

Abstract

We are concerned with travelling wave solutions to a quasilinear reaction-diffusion equation with discontinuous density dependent diffusion that can degenerate or be singular at equilibrium points 0 and 1. The reaction term is of the so-called Fisher–KPP type and it is a continuous, possibly non-Lipschitz function. We investigate the joint influence of the reaction and diffusion terms on the existence and non-existence of travelling waves whose profile is a non-smooth function in general. We formulate conditions under which solutions exist for a continuum of wave speeds and provide estimates for the minimal speed. Assuming that the reaction and diffusion terms are of power-type near equilibria, we also study asymptotic behaviour of corresponding wave profiles.