Travelling waves for generalized Fisher-Kolmogorov equation with discontinuous density dependent diffusion

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Abstract

We are concerned with the existence and qualitative properties of travelling wave solutions for a quasilinear reaction-diffusion equation on the real line. We consider a non-Lipschitz reaction term of Fisher–KPP type and a discontinuous diffusion coefficient that allows for degenerations and singularities at equilibrium points. We investigate the joint influence of the reaction and diffusion terms on the existence and nonexistence of travelling waves and, assuming these terms are of power-type near equilibria, we provide classification of solutions based on their asymptotic properties. Our approach provides a broad theoretical background for the mathematical treatment of rather general models not only in population dynamics but also in other applied sciences and engineering.

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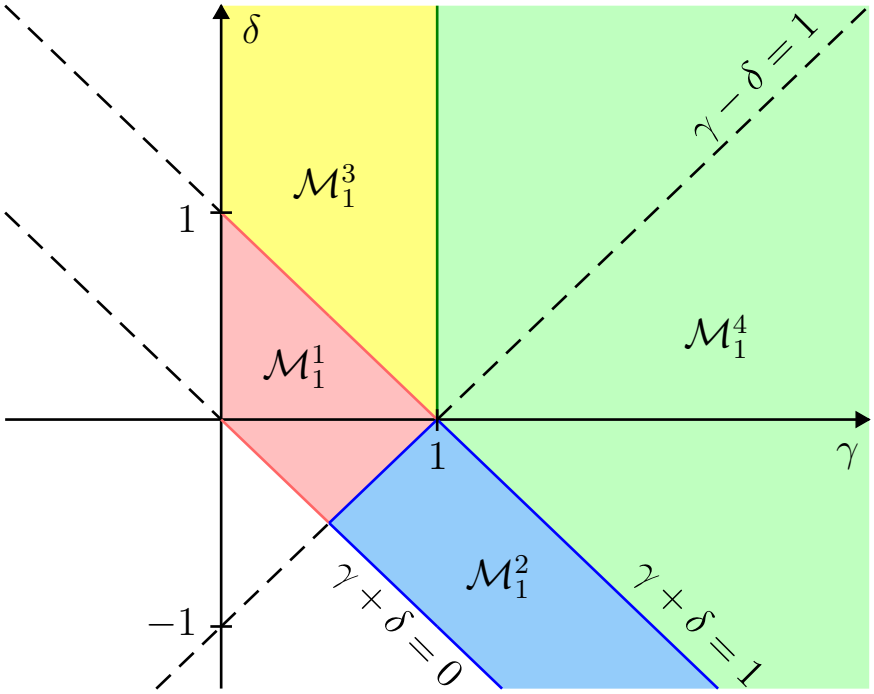

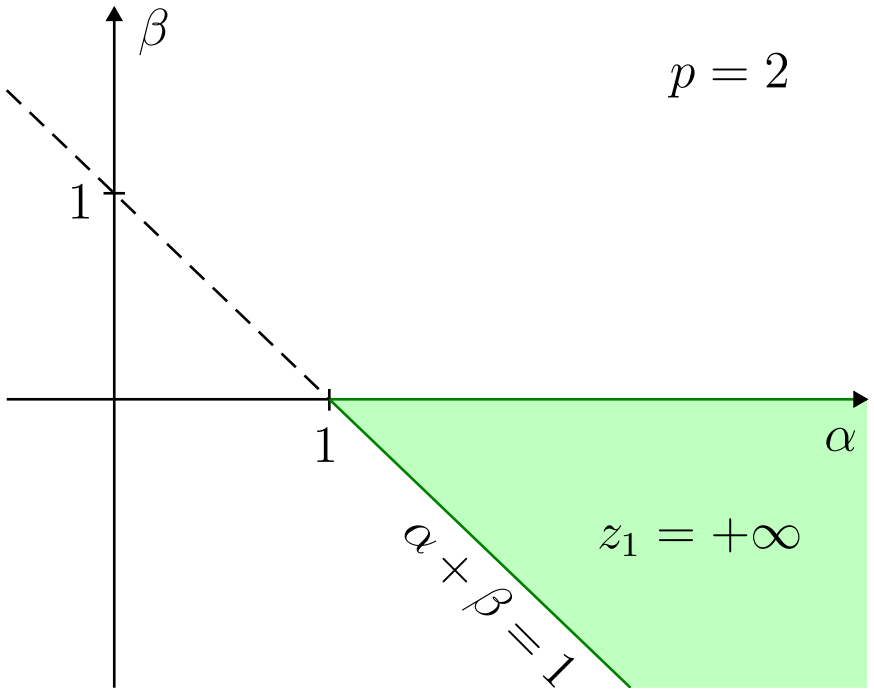

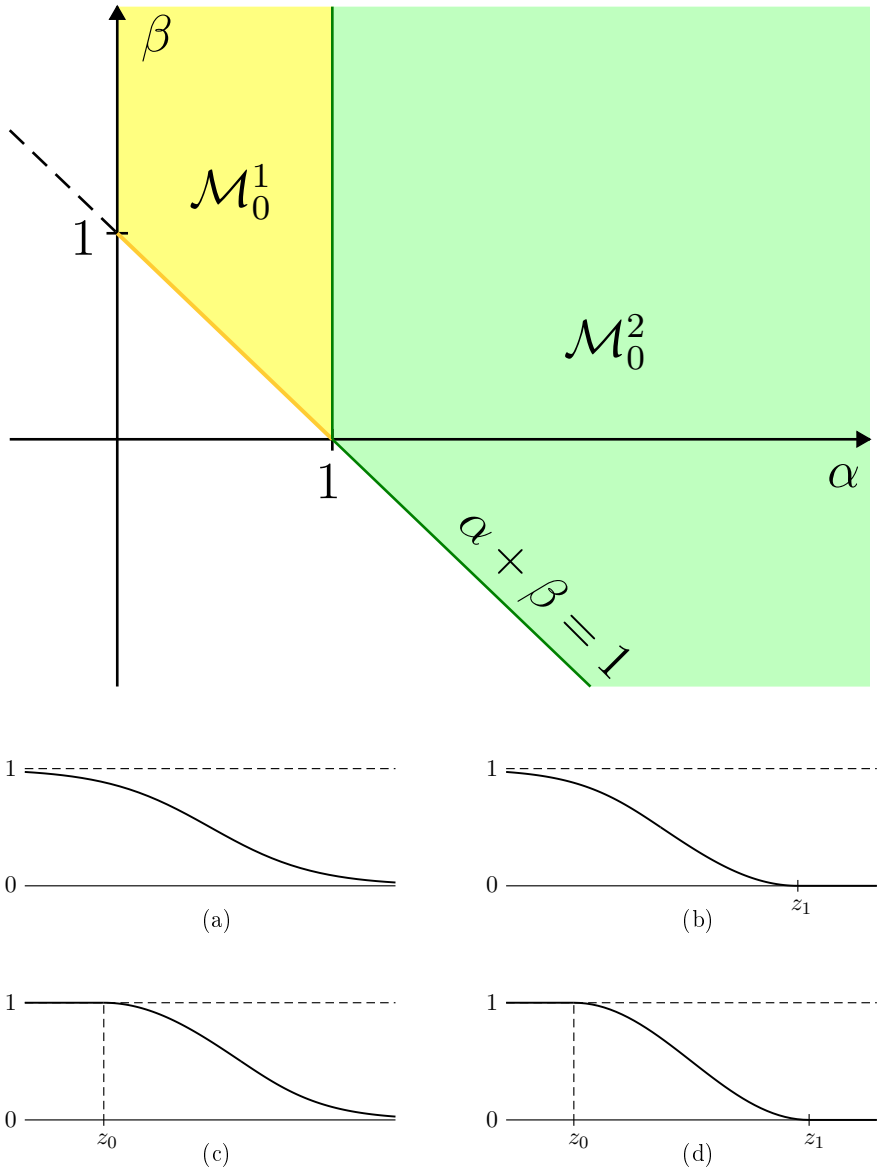

(a)

(b)

(c)

(d)