

A NOTE ON CONLEY INDEX AND SOME PARABOLIC PROBLEMS WITH LOCALLY LARGE DIFFUSION

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ABSTRACT. We prove singular Conley index continuation results for a class of scalar parabolic equations with locally large diffusion considered by Fusco [7] and Carvalho and Pereira [5].

1. Introduction

Evolution equations with large diffusion were studied in numerous papers, starting with the work [8] by Hale, cf. also [4], [9], [7], [5], [10], [11]. In those papers results like global bounds of solutions, asymptotic spatial homogenization, existence of invariant manifolds and existence of global attractors and their upper or lower semicontinuity, as the diffusion goes to infinity, are obtained.

In a pioneering work [7] Fusco considered the scalar reaction diffusion problem

$$(E_\varepsilon) \quad u_t = (a_\varepsilon u_x)_x + f(x, u), \quad 0 < x < 1, \quad t > 0,$$

subject to the following separated boundary conditions:

$$(S_\varepsilon) \quad \begin{cases} \rho u - (1 - \rho)a_\varepsilon u_x = 0, & x = 0, t > 0 \\ \sigma u + (1 - \sigma)a_\varepsilon u_x = 0, & x = 1, t > 0. \end{cases}$$

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