

CONLEY INDEX CONTINUATION FOR A SINGULARLY PERTURBED PERIODIC BOUNDARY VALUE PROBLEM

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ABSTRACT. We establish spectral convergence and Conley index continuation results for a class of singularly perturbed periodic boundary value problems.

1. Introduction

This paper is a sequel to our previous articles [2] and [3]. In the paper [3] we considered, with $\varepsilon > 0$ small, a family

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

of semilinear boundary value problems.

Here, $0 \leq \rho, \sigma \leq 1$ and $g_\varepsilon(x, u)$ is a nonlinearity satisfying certain (mild) regularity assumptions. The diffusion coefficient a_ε is large except in some small neighbourhood of each of the $n+1$ subdivision points of $[0, 1]$ in which a_ε , divided by the length of the neighbourhood, is small as $\varepsilon \rightarrow 0$. Moreover, there is some transitory behavior between such neighbourhoods.

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