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ATTRACTORS FOR PARABOLIC PROBLEMS WITH NONLINEAR BOUNDARY CONDITIONS IN FRACTIONAL POWER SPACES

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Abstract. In this work we prove existence of global attractors for reaction-diffusion problems with nonlinear boundary conditions in fractional power spaces X^α which are embedded in $\mathbf{C}$, without assuming growth conditions on the reaction term. The hypotheses are natural and easy to verify in many applications. The tools employed are comparison principles and interpolation theory.

AMS (MOS) subject classification: 35B40, 35K55, 35K57, 46E35.

1. Introduction

Let Ω be a bounded smooth ($\mathbf{C}^\infty$) domain of $\mathbb{R}^n$. In this paper we consider reaction diffusion systems with dispersion of the form

$$\begin{cases} u_t = \mathrm{Div}(a\nabla u) - \displaystyle\sum_{j=1}^{n} B_j(x)\frac{\partial u}{\partial x_j} - \lambda u + f(u), & \text{in} \quad \Omega, \\ \dfrac{\partial u}{\partial n_a} = g(u), \qquad \text{on} \quad \partial\Omega. \end{cases} \tag{1.1}$$

where $u = (u_1, \cdots, u_N)^\top$, $N \geq 1$, $a(x) = \mathrm{diag}(a_1(x), \cdots, a_N(x))$, $a_i \in C^1(\overline{\Omega})$, $a_i(x) > m_0 > 0$, $x \in \Omega$, $1 \leq i \leq N$, $\frac{\partial u}{\partial n_a} = \langle a\nabla u, \vec{n}\rangle$, $\vec{n}$ is the outward normal, λ is a positive constant and $B_j = \mathrm{diag}(b_j^1, \cdots, b_j^N)$ is continuous in $\bar{\Omega}$, $j = 1, \cdots, n$. Let $f = (f_1, \cdots, f_N)^\top : \mathbb{R}^N \to \mathbb{R}^N$, $g = (g_1, \cdots, g_N)^\top : \mathbb{R}^N \to \mathbb{R}^N$ be smooth functions.

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