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THE LONG-TIME BEHAVIOR OF WEIGHTED p-LAPLACIAN EQUATIONS

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Abstract. In this work we study weighted p-Laplacian equations in a bounded domain with a variable and generally non-smooth diffusion coefficient having at most a finite number of zeroes. The main attention is focused on the case that the diffusion coefficient $a(x)$ in such equations satisfies the inequality $\liminf_{x\to z} |x-z|^{-p}a(x) > 0$ for every $z \in \overline{\Omega}$. We show the existence of weak solutions and global attractors in $L^2(\Omega)$, $L^q(\Omega)(q \geq 2)$ and $D_0^{1,p}(\Omega)$, respectively.

1. Introduction

Let Ω be a bounded smooth domain in $\mathbb{R}^n$ $(n \geq 2)$. We consider weighted p-Laplacian equations

$$\begin{cases} \dfrac{\partial u}{\partial t} - \operatorname{div}(a(x)|\nabla u|^{p-2}\nabla u) + f(u) = g & \text{in } \Omega \times \mathbb{R}^+, \\ u = 0 & \text{on } \partial\Omega \times \mathbb{R}^+, \\ u(x,0) = u_0 & \text{in } \Omega, \end{cases} \tag{1.1}$$

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