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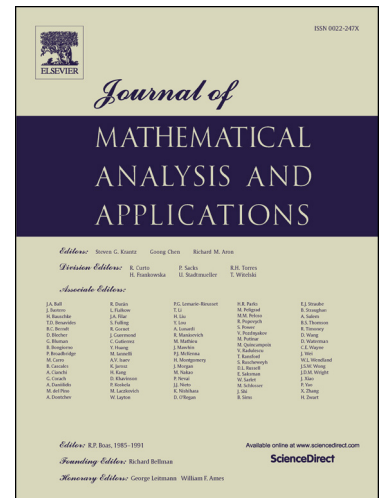
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# Existence and blow-up rate of large solutions of $p(x)$ -Laplacian equations with gradient terms

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## Abstract

In this paper we investigate boundary blow-up solutions of the problem

$$\begin{cases} -\Delta_{p(x)}u + f(x, u) = \pm K(x)|\nabla u|^{m(x)} & \text{in } \Omega, \\ u(x) \rightarrow +\infty & \text{as } d(x, \partial\Omega) \rightarrow 0, \end{cases}$$

where  $\Delta_{p(x)}u = \operatorname{div}(|\nabla u|^{p(x)-2}\nabla u)$  is called the  $p(x)$ -Laplacian. Our results extend the previous work [25] of Y. Liang, Q.H. Zhang and C.S. Zhao from the radial case to the non-radial setting, and [43] due to Q.H. Zhang and D. Motreanu from the assumption that  $K(x)|\nabla u(x)|^{m(x)}$  is a small perturbation, to the case in which  $\pm K(x)|\nabla u|^{m(x)}$  is a large perturbation. We provide an exact estimate of the pointwise different behavior of the solutions near the boundary in terms of  $d(x, \partial\Omega)$  and in terms of the growth of the exponents. Furthermore, the comparison principle is no longer applicable in our context, since  $f(x, \cdot)$  is not assumed to be monotone in this paper.

**Key Words:**  $p(x)$ -Laplacian; subsolution; supersolution; boundary blow-up solution; singularity.

**Mathematics Subject Classification(2010):** 35J25; 35J62

## 1 Introduction

Let  $\Omega \subset \mathbb{R}^N$ ,  $N \geq 2$ , be a bounded domain with  $C^2$  boundary  $\partial\Omega$ . We consider boundary blow-up solutions of the variable exponent elliptic problem

$$\begin{cases} -\Delta_{p(x)}u + f(x, u) = \pm K(x)|\nabla u|^{m(x)} & \text{in } \Omega, \\ u(x) \rightarrow +\infty & \text{as } d(x, \partial\Omega) \rightarrow 0, \end{cases} \quad (\text{P}_{\pm})$$

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