

EXISTENCE OF SOLUTIONS FOR THE (p, N) -LAPLACIAN EQUATION WITH LOGARITHMIC AND CRITICAL EXPONENTIAL NONLINEARITIES

JIALIN JIANG — YANG YANG

ABSTRACT. This paper deals with the following (p, N) -Laplacian equation with logarithmic and critical exponential nonlinearities. Precisely, we study the problem

$$\begin{cases} -\Delta_p u - \Delta_N u = |u|^{q-2} u \ln |u|^2 + \lambda f(u) & \text{in } \Omega, \\ u = 0 & \text{on } \partial\Omega, \end{cases}$$

where $\Omega \subset \mathbb{R}^N$ is a bounded domain, $N \geq 2$, $1 < p < N < q$, $\lambda > 0$ is a positive real parameter. By applying variational methods, we obtain the existence of solutions.

1. Introduction and main results

This paper concerns with the existence of solutions for the following class of equations:

$$(1.1) \quad \begin{cases} -\Delta_p u - \Delta_N u = |u|^{q-2} u \ln |u|^2 + \lambda f(u) & \text{in } \Omega, \\ u = 0 & \text{on } \partial\Omega, \end{cases}$$

2020 *Mathematics Subject Classification*. Primary: 35J60, 35J35; Secondary: 35D30, 35B33.

Key words and phrases. (p, N) -Laplacian; variational methods; logarithmic nonlinearity; exponential critical growth.

Y. Yang was supported by NSFC (No. 11501252, No. 11571176).