

Existence of multiple positive solutions for singular p-q-Laplacian problems with critical nonlinearities

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Abstract

In this article, we consider the following p-q-Laplacian system with singular and critical nonlinearity
$$\begin{cases} -\Delta_p u - \Delta_q u = \frac{h_1(x)}{u^r} + \lambda \frac{\alpha}{\alpha + \beta} u^{\alpha-1} v^{\beta} & \text{in } \Omega, \\ -\Delta_p v - \Delta_q v = \frac{h_2(x)}{v^r} + \lambda \frac{\beta}{\alpha + \beta} u^{\alpha} v^{\beta-1} & \text{in } \Omega, \\ u, v > 0 & \text{in } \Omega, \\ u = v = 0 & \text{on } \partial\Omega, \end{cases}$$
 where Ω is a bounded domain in \mathbb{R}^n with smooth boundary $\partial\Omega$. $\lambda, \lambda \in (0, \Lambda^*)$ is parameter with Λ^* is a positive constant and $h_1(x), h_2(x) \in L^{\infty}(\Omega)$, $h_1(x), h_2(x) > 0$. We show the existence and multiplicity of weak solution of equation above for suitable range of λ .

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