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On the Existence of Nontrivial Solutions of Quasi-asymptotically Linear Problem for the P-Laplacian

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摘要 In this paper, we study the existence of nontrivial solutions for the following Dirichlet problem for the p-Laplacian ($p > 1$): $-\Delta_p u \equiv -\operatorname{div}(|\nabla u|^{p-2} \nabla u) = f(x, u)$, $x \in \Omega$, $u = 0$, $x \in \partial \Omega$, where Ω is a bounded domain in \mathbb{R}^N ($N \geq 1$) and $f(x, u)$ is quasi-asymptotically linear with respect to $|u|^{p-2} u$ at infinity. Recently it was proved that the above problem has a positive solution under the condition that $f(x, s)/s^{p-1}$ is nondecreasing with respect to s for all $x \in \Omega$ and some others. In this paper, by improving the methods in the literature, we prove that the functional corresponding to the above problem still satisfies a weakened version of (P.S.) condition even if $f(x, s)/s^{p-1}$ isn't a nondecreasing function with respect to s , and then the above problem has a nontrivial weak solution by Mountain Pass Theorem.

关键词 [quasi-asymptotically linear](#) [weak solution](#) [critical point](#)

分类号

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Abstract In this paper, we study the existence of nontrivial solutions for the following Dirichlet problem for the p-Laplacian ($p > 1$): $-\Delta_p u \equiv -\operatorname{div}(|\nabla u|^{p-2} \nabla u) = f(x, u)$, $x \in \Omega$, $u = 0$, $x \in \partial \Omega$, where Ω is a bounded domain in \mathbb{R}^N ($N \geq 1$) and $f(x, u)$ is quasi-asymptotically linear with respect to $|u|^{p-2} u$ at infinity. Recently it was proved that the above problem has a positive solution under the condition that $f(x, s)/s^{p-1}$ is nondecreasing with respect to s for all $x \in \Omega$ and some others. In this paper, by improving the methods in the literature, we prove that the functional corresponding to the above problem still satisfies a weakened version of (P.S.) condition even if $f(x, s)/s^{p-1}$ isn't a nondecreasing function with respect to s , and then the above problem has a nontrivial weak solution by Mountain Pass Theorem.

Key words [quasi-asymptotically linear](#) [weak solution](#) [critical point](#)

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