Nehari Manifold approach to p- Laplacian eigenvalue problem with variable exponent terms

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Abstract

The multiplicity of positive solutions for problem

$$(\mathbf{P})\begin{cases}-\Delta_p u=\lambda a(x)|u|^{q(x)-2}u+b(x)|u|^{r(x)-2}u; & in \quad \Omega\\ u\equiv 0; & on \quad \partial\Omega.\end{cases}$$

is discussed. This investigation is based on Nehari manifold technique and variational argument.

Keywords: Nehari Manifold, fibering map, variable exponent Lebesgue space, variable exponent Sobolev space.
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1 Introduction

The classes of problems dealing with variable exponent Lebesgue and Sobolev space have attracted steadily increased interest over the last ten years, although their history goes back to W. Orlicz (see for example [5]). We mention briefly, some of the basic definition and refer to [2, 3, 4, 5, 6] for the fundamental properties of these spaces. The basic definition of variable exponent Lebesgue space is mentioned in the following. Let Ω be an open subset of $\mathbb{R}^N$, $q\in L^\infty(\Omega)$ and

$$q^- := ess\inf_{x\in\Omega} p(x)\geq 1.$$

The variable exponent Lebesgue space $\mathbf{L}^{q(.)}(\Omega)$ is defined by

$$\mathbf{L}^{q(.)}(\Omega)=\{u:\ u:\Omega\longrightarrow\mathbb{R}\ \ is\ measurable, \int_\Omega |u|^{q(x)}dx<\infty\};$$

which is a considered by the norm

$$|u|_{\mathbf{L}^{q(.)}(\Omega)}=\inf\{\sigma>0:\ \int_\Omega |\frac{u}{\sigma}|^{q(x)}dx\leq 1\}.$$

We have consider problem $(\mathbf{P})$ with the following conditions:

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