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EXISTENCE OF POSITIVE RADIAL SOLUTIONS OF $(P(X), Q(X))$-LAPLACIAN SYSTEMS

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Abstract. Unlike previous studies, where the authors used a qualitative domain, and it should be open and bounded, in this paper, by using sub and super solutions method combined with the symmetry conditions, we prove the existence of weak positive radial solutions of a system of differential equations with right hand side defined as a multiplication of two separate functions. This result improves and improves many results in the literature in ([3]-[43]).

Keywords. Positive radial solutions, p(x)-Laplacian problems, Boundary value problems.

AMS (MOS) subject classification: 35J60, 35B30, 35B40.

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1 Introduction

In this paper, we prove the following existence of weak positive radial solutions of a system of differential equations

$$\begin{cases} -\triangle_{p(x)} u = \lambda \left[a(x) f(u) h(v) \right] \text{ in } \Omega, \\ -\triangle_{q(x)} v = \mu \left[b(x) g(u) \tau(v) \right] \text{ in } \Omega, \\ u = v = 0 \text{ on } \partial\Omega, \end{cases} \tag{1}$$

where $\Omega = B(0,R) = \left\{ x \in \mathcal{R}^N : |x| < R \right\} \subset \mathcal{R}^N$ is a ball, where R is a sufficiently large constant. $\partial\Omega$, and $1 < p(x), q(x) \in C^1\left(\mathcal{R}^N\right)$ are functions with $1 < p^- := \inf_\Omega p(x) \leq p^+ := \sup_\Omega p(x) < \infty$, $1 < q^- := \inf_\Omega q(x) \leq q^+ := \sup_\Omega q(x)$ and $\Delta_{p(x)}$ is a $p(x)-$Laplacian defined as