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EXISTENCE AND NONEXISTENCE OF RADIAL POSITIVE SOLUTIONS OF SUPERLINEAR ELLIPTIC SYSTEMS

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Abstract

The main goal in this paper is to prove the existence of radial positive solutions of the quasilinear elliptic system

$$(S^+)\begin{cases} -\Delta_p u = f(x,u,v) & \text{in } \Omega, \\ -\Delta_q v = g(x,u,v) & \text{in } \Omega, \\ u = v = 0 & \text{on } \partial\Omega, \end{cases}$$

where Ω is a ball in $\mathbf{R}^N$ and f, g are positive continuous functions satisfying $f(x,0,0) = g(x,0,0) = 0$ and some growth conditions which correspond, roughly speaking, to superlinear problems. Two different sets of conditions, called strongly and weakly coupled, are given in order to obtain existence. We use the topological degree theory combined with the blow up method of Gidas and Spruck. When $\Omega = \mathbf{R}^N$, we give some sufficient conditions of nonexistence of radial positive solutions for Liouville systems.

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