

1132-35-31

**Maya Chhetri, Lakshmi Sankar, Ratnasingham Shivaji and Byungjae Son\***

(b\_son@uncg.edu), 830 W Market Street, Apt 623, Greensboro, NC 27401. *An existence result for superlinear semipositone  $p$ -Laplacian systems on the exterior of a ball.*

We study the existence of positive radial solutions to the problem

$$\begin{cases} -\Delta_p u = \lambda K_1(|x|)f(v) & \text{in } \Omega_e, \\ -\Delta_p v = \lambda K_2(|x|)g(u) & \text{in } \Omega_e, \\ u = v = 0 & \text{if } |x| = r_0, \\ u(x) \rightarrow 0, v(x) \rightarrow 0 & \text{as } |x| \rightarrow \infty, \end{cases}$$

where  $\Delta_p w := \operatorname{div}(|\nabla w|^{p-2} \nabla w)$ ,  $1 < p < n$ ,  $\lambda$  is a positive parameter,  $r_0 > 0$  and  $\Omega_e := \{x \in \mathbb{R}^n \mid |x| > r_0\}$ . Here  $K_i : [r_0, \infty) \rightarrow (0, \infty)$ ,  $i = 1, 2$  are continuous functions such that  $\lim_{r \rightarrow \infty} K_i(r) = 0$ , and  $f, g : [0, \infty) \rightarrow \mathbb{R}$  are continuous functions which are negative at the origin and have a superlinear growth at infinity. We establish the existence of a positive radial solution for small values of  $\lambda$  via degree theory and rescaling arguments. (Received June 30, 2017)