1116-35-2607 **Eun Kyoung Lee**, **Ratnasingham Shivaji** and **Byungjae Son*** (b_son@uncg.edu), Department of Mathematics and Statistics, UNCG, Greensboro, NC 27412. *Positive radial solutions to classes of singular problems on the exterior domain of a ball.*

We study positive radial solutions to singular boundary value problems of the form:

$$\begin{cases} -\Delta u = \lambda K(|x|)\frac{f(u)}{u^\alpha}, & \text{in } \Omega, \\ \frac{\partial u}{\partial \eta} + \tilde{c}(u)u = 0, & |x| = r_0, \\ u(x) \to 0, & |x| \to \infty, \end{cases}$$

where $\Delta u := \mathrm{div}(\nabla u)$ is the Laplacian operator of u, $\Omega = \{x \in \mathbb{R}^N \| x| > r_0 > 0, N > 2\}$, $\lambda > 0$, $K \in C([r_0, \infty), (0, \infty))$ is such that $K(s) \leq \frac{1}{s^{N+\hat{\beta}}}$ for $s \gg 1$ for some $\hat{\beta} > 1$, $\alpha < \min\{1, \frac{\hat{\beta}}{N-2}\}$ and $\frac{\partial u}{\partial \eta}$ is the outward normal derivative of u on $|x| = r_0$. Here, $f \in C^1([0, \infty), \mathbb{R})$ is such that $\frac{f(s)}{s^{1+\alpha}} \to 0$ as $s \to \infty$, and $\tilde{c} \in C([0, \infty), (0, \infty))$. We analyse the cases when (a) $f(0) > 0$ and (b) $f(0) < 0$. We discuss existence, non-existence, multiplicity and uniqueness results. We prove our existence results by the method of sub and supersolutions. (Received September 22, 2015)