1016-35-266 **Fengbo Hang**, **Xiaodong Wang** and **Xiaodong Yan*** (`xiayan@math.msu.edu`), Department Of Mathematics, Michigan State University, East Lansing, MI 48864. *Sharp Integral Inequalities for harmonic functions.*

Consider variational problem

$c_{p,n}^{\frac{np}{n-1}} = \sup\{\int_{R_+^n} |Pf(x)|^{\frac{np}{n-1}} dx : f \in L^p(R^{n-1}) \text{with } |f|_{L^p(R^{n-1})} = 1\}$. Here Pf is the harmonic extension of f. For $1 < p < \infty$, we show the following: 1. existence and radial symmetry with respect to certain points of extremal functions. For special value p, we can find exact form of extremal functions. 2. We prove regularity and radial symmetry with respect to certain points for critical functions. More precisely, we show that any critical point in $L_{loc}^p(R^{n-1})$ is smooth; any critical point in $L^p(R^{n-1})$ is radially symmetric with respect to some point and strictly decreasing along radial direction. (Received February 13, 2006)