1056-35-1977 **Yi Li*** (yi-li@uiowa.edu), Department of Mathematics, University of Iowa, and Xian Jiaotong University, Iowa City, IA 52242, and **Shuangjie Peng** (sjpeng@mail.ccnu.edu.cn), School of Mathematics and Statistics, Central China Normal University, Wuhan, 430079, Peoples Rep of China. *Multiple Solutions to an Elliptic Problem Related to Vortex Pairs.*

We consider the problem $-\Delta u = \lambda(u-\varphi)_+^{p-1}, x \in \Omega, u|_{\partial\Omega} = 0$, where Ω is a bounded domain in $\mathbb{R}^N$, φ is a positive harmonic function in $\overline{\Omega}$.

This problem is related to steady vortex pairs in an ideal fluid. Under the following condition: φ has k ($k \geq 1$) strictly local minimum points $\bar{z}_1, \cdots, \bar{z}_k \in \partial\Omega$, we are able to prove the existence of a solution pair (u_λ, A_λ) satisfying that the "vortex core" (where $u_\lambda > \varphi$) A_λ has exactly k components $A_{\lambda,j}$, $j = 1, \cdots, k$ which shrink to the points $\bar{z}_1, \cdots, \bar{z}_k$ respectively as $\lambda \to +\infty$. Moreover, $A_{\lambda,j}$ is approximately a ball with very precise estimates of $z_j - \bar{z}_j$ and $diam(A_{\lambda,j})$. (Received September 22, 2009)