1067-35-1983   **Yi Li*** (`yi-li@uiowa.edu`), Iowa City, IA 52242, and **Shuangjie Peng** (`sjpeng@mail.ccnu.edu.cn`), Wuhan, Hubei , Peoples Rep of China. *Multi-peak Solutions to Two Types of Free Boundary Problems.*

We consider the existence of multi-peak solutions to free boundary problems arising in confined plasma and steady vortex pair under conditions on the nonlinearity we believe to be almost optimal. Our results show that the core of the solution has multiple connected components, whose boundary called free boundary of the problems consists approximately of spheres which shrink to distinct single points as the parameter tends to zero. (Received September 22, 2010)