Let $\Omega$ be a bounded domain in $\mathbb{R}^2$, $u_+ = u$ if $u \geq 0$, $u_+ = 0$ if $u < 0$, $u_- = u_+ - u$. In this talk we study the existence of solutions to the following problem arising in the study of a simple model of a confined plasma

\[
(P_\lambda) \begin{cases}
\Delta u - \lambda u_- = 0, & \text{in } \Omega, \\
 u = c, & \text{on } \partial \Omega, \\
 \int_{\partial \Omega} \frac{\partial u}{\partial \nu} \, ds = I,
\end{cases}
\]

where $\nu$ is the outward unit normal of $\partial \Omega$ at $x$, $c$ is a constant which is unprescribed, and $I$ is a given positive constant.

The set $\Omega_\rho = \{ x \in \Omega, \ u(x) < 0 \}$ is called plasma set. Existence of solutions whose plasma set consisting of one component and asymptotic behavior of plasma set were studied by Caffarelli and Friedman for large $\lambda$. Under the condition that the homology of $\Omega$ is nontrivial we obtain in this paper by a constructive way that for any given integer $k \geq 1$, there is $\lambda_k > 0$ such that for $\lambda > \lambda_k$, $(P_\lambda)$ has a solution with plasma set consisting of $k$ components. (Received January 16, 2011)