1044-35-125 **Peter Bates** (bates@math.msu.edu), **Kening Lu** (klu@math.byu.edu) and **Chongchun Zeng*** (zengch@math.gatech.edu), School of Mathematics, Georgia Institute of Technology, 686 Cherry Street, Atlanta, GA 30332. *Invariant manifold of dynamic spike solutions to a singular parabolic equation.*

Consider a nonlinear parabolic equation $u_t = \epsilon^2 \Delta u - u + f(u)$ on a smooth bounded domain $\Omega \subset R^n$ with the zero Neumann boundary condition. In the past years, there had been extensive studies on steady spike solutions. Here a spike solution u is one which is almost equal to zero everywhere except on a ball of radius $O(\epsilon)$ where $u = O(1)$. In this talk, we show that there exist dynamic spike solutions which maintain the spike profile for all $t \in R$ with the spike moving on $\partial\Omega$. Moreover, these dynamic spike states form an invariant manifold in some appropriate function space, which is diffeomorphic to $\partial\Omega$. It is also proved that the leading order dynamics of the spike location follows the gradient flow of the mean curvature of $\partial\Omega$. (Received August 27, 2008)