1023-37-814 **Marina Bevzushenko*** (marinavb@math.bu.edu). *Mathematical analysis of an integro-differential equation arising in neuroscience.*

I study the class of nonlinear integro-differential equations

$$\frac{\partial u(x,t)}{\partial t} = -u(x,t) + \int_{-\infty}^{\infty} w(x-y) f(u(y,t)-\theta)\, \mathrm{d}y + h.$$

These equations arise in neuroscience for modeling short-term memory and were introduced by Shun-ichi Amari in 1977. Here $u(x,t)$ is the average membrane potential of the neurons. I study N-*bump* solutions, where $N = 1, 2$.

For 1-bump solutions, I study the stability of 1-bump solutions. I show that perturbations of the endpoints of the intervals of the excited region is not only a necessary but also sufficient to establish their linear stability.

For 2-bump solutions, I show that the necessary criteria for the existence of equal width 2-bump solutions, developed by William Troy and Carlo Laing, are sufficient as well, with one extra, natural condition. Further, I explore 1-bump solutions with a dimple and show that for some coupling functions it is possible for this type of solution to become a 2-bump solution.

One of the main analytical techniques I use is to approximate $w(x)$, in order to determine how solution properties depend on the parameters and characteristics of $w(x)$. (Received September 21, 2006)