1115-35-15 **Linghai Zhang*** (liz5@lehigh.edu), 14 East Packer Ave, Bethlehem, PA 18015. *Existence and Stability of Infinitely Many Traveling Pulse Solutions of Nonlinear Singularly Perturbed System of Integral Differential Equations Arising from Synaptically Coupled Neuronal Networks.*

Consider the following nonlinear singularly perturbed system of integral differential equations arising from synaptically coupled neuronal networks

$$\begin{aligned}
\frac{\partial u}{\partial t} + u + w &= \alpha \int_0^\infty \xi(c) \left[\int_{\mathbb{R}} K(x-y) H\left(u\left(y, t - \frac{1}{c}|x-y| \right) - \theta \right) \mathrm{d}y \right] \mathrm{d}c \\
&+ \beta \int_{\mathbb{R}} W(x-y) H(u(y,t) - \Theta) \mathrm{d}y, \\
\frac{\partial w}{\partial t} &= \varepsilon(u - \gamma w).
\end{aligned}$$

In this system, K and W represent synaptic couplings between neurons in synaptically coupled neuronal networks.

The main purpose of this paper is to accomplish the existence and stability of infinitely many fast traveling pulse solutions as well as the existence and instability of infinitely many slow traveling pulse solutions of the nonlinear singularly perturbed system of integral differential equations arising from synaptically coupled neuronal networks. We will introduce speed index functions and stability index functions, establish a global strong maximum principle for the stability index functions, couple together linearized stability criterion and stability index function to accomplish the existence and stability/instability of fast/slow multiple traveling pulse solutions of the system. (Received July 13, 2015)