1135-AH-1287 **Jianzhong Su*** (su@uta.edu), Department of Mathematics, University of Texas at Arlington, Arlington, TX 76019, and **Sat byul Seo** and **Ege Kavalali**. *Discontinuous coefficient diffusion models of neurotransmitter release for independent synaptic currents.*

Synapses play a major role in neuron communications in the brain. The synapses act through a chemical process called synaptic fusion between pre-synaptic and post-synaptic terminals. In the paper, we develop a mathematical model in 3-D to emulate spontaneous and evoked neurotransmissions resulted from glutamate release within a single synapse. We propose numerical methods for solving piecewise continuous heat diffusion equation, estimate and verify its errors of second order accuracy. In order to identify the spatial relation between spontaneous and evoked glutamate releases, we consider quantitative factors, such as the size of synapses, inhomogeneity of diffusion coefficients, the geometry of synaptic cleft, and the release rate of neurotransmitter, that will affect postsynaptic currents. We conclude quantitatively that as a synapse's size is smaller and if the synaptic cleft space is less diffusive in the peripheral area than the central area, then there is high possibility of having crosstalk between two signals from spontaneous and evoked releases. The computed results match well with existing experimental indings and provide a quantitative map of boundaries of physical constraints for having independent synaptic fusion events. (Received September 20, 2017)