1154-37-58 **Rhiannan Reuf*** (`rhiannan.ruef677@myci.csuci.edu`), Mathematics Program, California State University, Channel Islands, 1 University Dr., Camarillo, CA 93012, and **Yasa Syed** (`yas33@scarletmail.rutgers.edu`), Department of Mathematics, Rutgers University, Hill Center for the Mathematical Sciences, Piscataway, NJ 08854. *Modeling New Low-Energy Defibrillation Methods and Heartbeat Patterns in Canines.*

Standard defibrillation methods rely on large electric fields that are often painful and damaging to the heart. Many spatially 2-D studies of low-energy defibrillation methods require knowledge of the number, phase, and/or location of the rotating waves that cause fibrillation. Here, we introduce a 3-D method that terminates these waves independently of such properties by applying a monophasic or biphasic low-energy electric field to detach the waves' axes of rotation from the surfaces. In the biphasic model, we found 9.6 and 12.8 ms to be optimal timings for the pulse separation and duration, respectively, terminating all rotating waves 87.5 - 89.7Unlike humans, the heartbeat pattern of normal dogs contains abrupt changes between long and short interbeat intervals. We present a new probabilistic model that defines these intervals as functions of the vagal and sympathetic stimuli from the nervous system and their probability of emerging from the sinus node, the heart's natural pacemaker. A computer model based on this algorithm replicated behavior seen in Poincaré plots (($n+1$)st vs. nth interbeat intervals) obtained experimentally from both normal and sinus node dysfunction dogs. (Received July 26, 2019)