1116-37-158 **Justin Eastman***, Department of Mathematics, Millersville University, 17551-0302, and **Julian Sass**, Department of Mathematics and Statistics, University of Maryland, Baltimore County, Baltimore, MD 21250. *Inducing Alternans in Cardiac Models using Delay Differential Equations.* Preliminary report.

Cardiac electrical alternans is a period-2 dynamical behavior with alternating long and short action potential durations (APD) that often precedes dangerous arrhythmias associated with cardiac arrest. Despite the importance of alternans, many current ordinary differential equations models of cardiac electrophysiology do not produce alternans, thereby limiting the use of models to study the mechanisms that underlie this conditions. Because delay differential equations (DDEs) commonly induce complex dynamics in other systems, we investigate whether incorporating DDEs can lead to alternans development in cardiac models. We use the Fox et al. canine ventricular action potential model, which produces alternans as published. After suppressing the alternans in the original model, we restore alternans by introducing DDEs and quantitatively compare the DDE-induced alternans with the alternans present in the original model. We analyze the gating variables of the model to study the effects of implementing DDEs and to determine how alternans is restored, and we discuss the mathematical and physiological implications of our findings. In the future, we aim to extend our approach to induce alternans in models that do not naturally produce such dynamics. (Received August 10, 2015)