1125-37-137 **Jamshaid Shahir***, Department of Mathematics and Statistics, 1000 Hilltop Circle, University of Maryland, Baltimore County, Baltimore, MD 21250, and **Kimberly Truong**, Division of Applied Mathematics, 182 George St, Brown University, Providence, RI 02912. *Using Delay Differential Equations to Study Calcium Alternans in a Model of Intracellular Calcium Cycling.*

Cardiac arrhythmias are irregular beatings of the heart caused by disruptions in the electrical activity that triggers contraction. One mechanism that can give rise to arrhythmias is calcium alternans, a dynamical state characterized by alternating large and small intracellular calcium concentrations in response to periodic stimuli. Despite the need to understand mechanisms for calcium-driven cardiac alternans, however, many ordinary differential equation models of intracellular calcium cycling do not produce alternans, thus restricting the scope of such models for studying alternans behavior. Delay differential equations (DDEs), which in many contexts produce complex dynamics, may be a promising tool for promoting alternans in cardiac models. We introduce DDEs in the equations for the calcium current gating variables, currents, and the release function in a model of intracellular calcium cycling. After suppressing alternans in the original model, we show that alternans can be induced by DDEs in certain compartments of the cell. We analyze the changes in the calcium concentrations, currents, and gating variables in response to these DDEs and discuss the mathematical and physiological implications of our findings. (Received August 03, 2016)