1135-35-204 **Anthony Guzman***, Department of Mathematics and Statistics, 111 Cummington Mall, Boston University, Boston, MA 02215, and **Ryan Vogt**, School of Mathematics, 206 Church St SE, University of Minnesota, Minneapolis, MN 55455. *Observability Analysis and Estimator Design for a Cardiac Cell Model.*

Certain cellular variables, such as ionic concentrations and gating states, are thought to be critical to the formation of dangerous cardiac arrhythmias, but some of these quantities may be difficult or impossible to measure directly during in vitro experiments. We examined the Luo-Rudy dynamic (LRd) model, which is a 17th-order nonlinear ODE model of the action-potential dynamics of a cardiac cell, as a basis for reconstructing important cellular variables. To determine whether measurements of any individual dynamical variable were sufficient to estimate the remaining variables, we used a Matlab-based numerical linearization approach to analyze a model property called observability. The observability results showed that membrane potential was sufficient for estimating the other dynamical variables in the model, and that strength of observability tended to increase with increasing heart rate. We adjusted several LRd parameters to amplify the alternans already present in the model, and showed that this parametric variation had a minimal impact on the observability results. For selected scenarios, Kalman filters were designed and tested with simulated data to check the effectiveness of reconstructing unmeasured variables from membrane potential and other quantities. (Received August 09, 2017)