1096-VG-1283 **Kiersten Utsey*** (kmutsey@gmail.com), **Samuel Estes**, **Erick Kalobwe**, **Heather Finotti** and **Xiaopeng Zhao**. *Mathematical Modeling of Fetal Electrocardiograms.*

Some of the most common and fatal birth defects are related to the heart. In adults, possible heart conditions are often identified through the use of an electrocardiogram (ECG). However, due to the presence of other signals and noise in the recording, fetal electrocardiography has not yet proven effective in diagnosing these defects. This paper develops a mathematical model of three-dimensional heart vector trajectories, which we use to generate synthetic maternal and fetal ECG signals. This dipole vector model simulates the electrical activity of the heart as a single time-varying vector originating at the center of the body. We use a system of ordinary differential equations and two sets of parameters to simulate maternal and fetal cardiac activity. Various physiological factors, including heart rate variability and baseline wander, are also simulated. These cardiac dipole vectors are then projected onto three dimensional unit vectors to simulate fetal electrocardiogram (fECG) data collection. White noise and power line noise are added to the projections. Using this model, we have built a database of realistic, synthetic fECG signals using different parameter values and noise levels. This database can be used in effectiveness testing of fetal signal extraction algorithms. (Received September 14, 2013)