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Matthew Bowen* (mmbowen@math.duke.edu). *Spectral Deferred Correction and Alternans.*

In many experiments and simulations, the observation has been made that, under rapid period pacing, cardiac cells undergo a period-doubling bifurcation in which the duration of action potentials alternates between a long value and a short value. While in a single cardiac cell this bifurcation is understood, even in a one dimensional cable of cardiac cells, its exact nature is still unclear. A model introduced by Mitchell and Schaeffer exhibits this so called alternan behavior. Like most models of action potentials, this model has both "fast" and "slow" timescales, resulting in a relatively stiff numerical problem. In 2 or 3 spatial dimesions, this makes mesh refinement inefficient. In this talk, I will discuss the results of applying a spectral deferred correction method to the reaction-diffusion system suggested by the model. In particular, I will focus on what the results say about the nature of these alternans and compare the efficiency of the method with the schemes currently used to solve the problem. (Received February 10, 2009)