Abstract Submitted
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Spatiotemporal dynamics and control of alternans in cardiac tissue with short-term memory[1] HANA DOBROVOLNY, Duke University, Dept. of Physics, ELENA TOLKACHEVA, SUNY Upstate Medical University, Dept. of Pharmacology, DANIEL GAUTHIER, Duke University, Dept. of Physics — Alternans is an abnormal cardiac rhythm that is a precursor of fibrillation. Recently, an amplitude equation describing spatiotemporal dynamics of alternans in a one-dimensional cable [1] was derived using a model that assumes the current action potential duration (APD) depends on the previous diastolic interval (DI). However, experimental work has shown that cardiac tissue is more accurately described by models that contain some degree of "memory," where the current APD depends on preceding APD's and DI's. We add memory to the amplitude equation and find that it adds a new parameter to the equation which governs the onset of alternans. We also find that memory affects the ability to control spatially concordant alternans, but has no effect on the ability to control discordant alternans. Analytical results are verified by simulations using the Fenton-Karma model. [1] B. Echebarria, A. Karma, *Chaos*, **12**:923 (2002)

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