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**Propagation Dynamics of Cardiac Action Potentials on a Ring**

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PLE HOUT, MATTHEW WUERFFEL, Department of Physics, Pacific Lutheran University, Tacoma, WA 98447 — We study the effects of the underlying ion-channel dynamics on the morphology and propagation of cardiac action potentials (AP) by investigating the stability of small perturbations to a steady-state AP rigidly propagating along a fiber of cardiac cells arranged in a ring. The Fox-McHarg-Gilmour model (FMGM) is used to describe the ion-channel dynamics, and a standard gap-junction term is used to couple neighboring cells. We compute the eigenvalues and eigenmodes of the infinitesimal evolution matrix in the moving frame and, along with numerous stable modes, find several unstable eigenmodes. Their frequencies are half-integer multiples of the fundamental frequency of action potential repetition, and represent alternans modes of increasing degree of discordance. Our results for a fiber of cells described by a physiologically realistic ion-channel model (FMGM) agree with earlier simulations for a single cardiac cell and for spiral waves in 2D cardiac tissue. The analysis provides the basis for developing more efficient electrical stimulation protocols for controlling alternans.

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