

Perturbed pulses proffer predictive power!

Control of excitable media is an important topic, most notably is control through the application of external electrical potentials for cardiac defibrillation. Models of cardiac tissue exhibit a stable quiescent state which does not develop patterns through a linear process, instead developing waves (and in higher spatial dimensions, spatiotemporal turbulence) through nonlinear effects which transiently affect the entire domain. I present work on the prediction of igniting — the creation of excitation waves — and quenching — the cessation of excitation waves. Critical perturbations affecting these transitions are, motivated through a parsimonious linear theory and heuristics informed by the continuous symmetry of the problem. The predictions are tested against direct numerical simulations for some illustrative models of excitable dynamics, which shows excellent agreement in most cases.