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Poster presentation

Modelling gap junctions in a neural field model

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We study a nonlinear, one-dimensional neural field model based upon a partial integro-differential equation, that is used to model spatial patterns in working memory. Through the application of Fourier transforms to the PIDE, steady states of spatially localised areas of high activity can be represented by solutions of a fourth order ODE. Recent research has shown a high density of gap junctions in areas of the brain that experience epileptic events. We extend the model by including a diffusion-like term to model gap junctions and derive a sixth order ODE which we use to investigate changes in the dynamics of spatially localised solutions. We find that symmetric homoclinic orbits to a zero steady state exist for a wide area of parameter space. Numerical work shows families of solutions are destroyed as the strength of the term modelling gap junctions increases.