A numerical study of the electrophysiological substrate of epilepsy

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Capturing these dynamics is essential for understanding both healthy brain function and pathological events, such as the initiation and spread of epileptic seizures. The approach solves the monodomain equation coupled with the Barreto-Cressman ionic model, which captures key interactions between excitatory and inhibitory neurons and the dynamics of extracellular potassium-a key factor in seizure-like activity. This model plays a crucial role in capturing the non-linear ionic exchanges responsible for wave initiation and propagation at the cellular level. Numerical simulations of an epileptic event on a two-dimensional heterogeneous context, considering isotropic grey matter and anisotropic white matter.