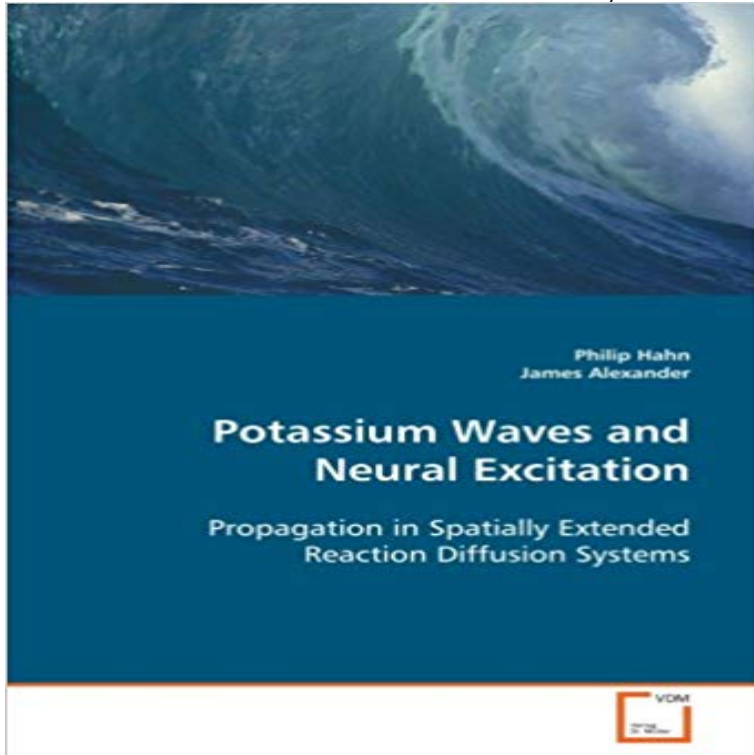


# Potassium Waves and Neural Excitation: Propagation in Spatially Extended Reaction Diffusion Systems



Propagation of functional or pathological ionic disturbances in biological systems plays an important role in normal regulatory mechanisms and in disease. For example, potassium diffusion in brain tissue is involved in spreading excitation. Models of this type of phenomenon often take the form of a reaction-diffusion system in one spatial dimension with continuous dynamic variables. This text examines propagation in three spatial dimensions through a network of discrete dynamic elements coupled by diffusion. Conditions permissive of pulse origination and propagation can be determined analytically for systems in one spatial dimension. However, in three spatial dimensions or in dynamic systems containing discontinuities, explicit solutions may not exist. Instead, the local dynamics of the excitable system at a point in space are analyzed. The effective diffusive flux or current at a point is interpreted as a slowly varying parameter. The bifurcation structure of the dynamics with respect to this parameter and the effect of waveform on the time course of the parameter are examined. Propagation results when an excursion at a point produces a diffusion current sufficient to move its resting neighbor above some threshold value. The formation of a pulse back depends on the stability of equilibria of the local dynamics. Propagation in some cases may also depend on the geometry of the wavefront. Predictions are verified by numerical simulation using a software package developed by the author. A three dimensional lattice allows for description of the local dynamics at nodal elements and diffusion between elements and throughout the lattice.

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(We extracellular potassium with bistable kinetics, to date plane waves propagate persistently even if the parame-. **Self-organization in precipitation reactions far from the equilibrium** Potassium Waves and Neural Excitation: Propagation in Spatially Extended Reaction Diffusion Systems - Taschenbuch. 2008, ISBN: 9783836493277. **Transient Localized Wave Patterns and Their Application to Migraine** To describe nucleation and propagation features of the SD wave The goal in the future will be to provide individualized neural tissue simulations. Keywords: migraine, reaction-diffusion, spreading depression, gyrification, neuromodulation A spatially more restricted SD pattern could result in less **Potassium Waves and Neural Excitation: Propagation in Spatially** Bookcover of Potassium Waves and Neural Excitation. Omni badge and Neural Excitation. 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