

## The Analysis of the Two Dimensional Huxley Equation Using the Galerkin Method

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**Abstract :** Real life problems such as the Huxley equation are always modeled as nonlinear differential equations. These problems need accurate and reliable methods for their solutions. In this paper, we propose a nonstandard finite difference method in time and the Galerkin combined with the compactness method in the space variables. This coupled method, is used to analyze a two dimensional Huxley equation for the existence and uniqueness of the continuous solution of the problem in appropriate spaces to be defined. We proceed to design a numerical scheme consisting of the aforementioned method and show that the scheme is stable. We further show that the stable scheme converges with the rate which is optimal in both the L2 as well as the H1-norms. Furthermore, we show that the scheme replicates the decaying qualities of the exact solution. Numerical experiments are presented with the help of an example to justify the validity of the designed scheme.

**Keywords :** Huxley equations, non-standard finite difference method, Galerkin method, optimal rate of convergence

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