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1.1.3 Introduction:

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Modeling How the  
cardiac cycle is produced  
by electrical impulses in  
the heart A computer  
model of the heart



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Numerical modeling of the electrical activity in the heart ventricles... (C. Vergara) Squirrels, Turing and Excitability - Mathematical Modelling in Biology, Ecology and Medicine Mathematical Model of Control System  
Solving Problems on Mathematical Modelling of Electrical System  
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Mathematical modeling  
of renal complications  
induced by cardiac  
surgery Coping with

Variability in  
Mathematical Modelling  
of the Heart

Mathematical Modelling  
Of Cardiac Electrical

This work presents  
mathematical modelling  
of cardiac electrical  
activity using bidomain  
approach with the main

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Modelling of  
Cardiac  
Electrical  
Activity

focus on cardiac action potential, an important basic electrical property of the heart. 1.1

## Bidomain Model

Bidomain model is one of the two differential equation based models for cardiac electrical activity.

~~Mathematical Modelling  
of Cardiac Electrical  
Activity ...~~

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J. ELECTROCARDIOLOGY 20 (3), 1987,  
219-226 Mathematical  
Modeling of Electrical  
Activity of the Heart BY  
ROBERT PLONSEY,  
PH.D. AND ROGER C.  
BARR, PH.D.

SUMMARY This paper  
reviews the literature on  
mathematical models of  
cardiac activation and  
evaluates these  
approaches against an

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analytical approach that includes both structure and membrane properties.

## Activity

~~Mathematical modeling of electrical activity of the heart...~~

Abstract. We introduce the Hodgkin-Huxley (HH) formulation describing the flow of ionic currents across the membrane of a cardiac

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cell, paying particular attention to the central concepts of activation and inactivation. We indicate a few situations in which HH-type modeling of cardiac cells has been useful, and show that continuous models of the HH-type break down when one observes phenomena in which single-channel behavior becomes

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Modeling Of  
Cardiac  
Mathematical Modeling  
of the Electrical Activity  
of ...

Mathematical and  
numerical modelling of  
the cardiovascular system  
is a research topic that  
has attracted remarkable  
interest from the  
mathematical  
community because of its  
intrinsic mathematical

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Modelling Of  
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difficulty and the increasing impact of cardiovascular diseases worldwide.

## Activity

~~The cardiovascular system: Mathematical modelling ...~~

Early development of ionic models for cardiac myocytes, from the pioneering modification of the Hodgkin – Huxley giant squid axon model



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by Noble to the iconic DiFrancesco – Noble model integrating voltage-gated ionic currents, ion pumps and exchangers,  $Ca^{2+}$  sequestration and  $Ca^{2+}$ -induced  $Ca^{2+}$  release, provided a general description for a mammalian Purkinje fibre (PF) and the framework for modern cardiac models. In the past two decades,

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development has focused  
on tissue-specific models

## Electrical

~~Mathematical models of  
the electrical action  
potential of ...~~

Abstract: Different  
electrical models of  
human heart, partial or  
complete, with linear or  
nonlinear models have  
been developed. In the  
literature, there are some

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applications of  
mathematical and  
physical analog models  
of total artificial heart  
(TAH), a baroreceptor  
model, a state-space  
model, an  
electromechanical  
biventricular model of  
the heart, and a  
mathematical model for  
the artificial generation of  
electrocardiogram  
(ECG) signals.

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~~Mathematical modelling  
of human heart as a ...~~

Pa ' sek et al. consider  
the role of cardiac T-  
tubules in the  
physiological modulation  
of electrical and  
contractile activity  
through development of  
a mathematical model of  
ventricular  
cardiomyocytes in which  
the cardiac transverse

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axial tubular system is described as a single compartment, allowing them to demonstrate the effects of this system on  $Ca^{2+}$  and  $K^+$  handling (Pašek et al. 2006).

~~Mathematical models in physiology~~—People  
Mathematical models have been widely used in the simulation of cardiovascular systems.

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The human cardiovascular system is highly complex and involves many control mechanisms. The model of Windkessel is a famous example of such a discrete model.

~~Mathematical Modelling of Human Heart as a ...~~  
do mathematical modeling and simulation (with Scilab and Xcos)

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for a RRLC circuit (page 6) Electrical voltage and current The electrical voltage (or potential difference)  $u_{BA}$  [V] between two points B and A, is defined as the work which would be done (or the energy required) in carrying a unit positive charge from one point to the other.

**Mathematical models**

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~~and simulation of  
electrical systems ...~~

Action potential,  
electrical activity of the  
heart, cardiac  
electrophysiology  
models, Landau-  
Ginzburg model,  
Hodgkin-Huxley model,  
Luo-Rudy model

Abstract Nowadays, due  
to the prevalence of  
cardiovascular diseases  
there is extremely high



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demand not only in the development of new means of treatment and diagnosis, but also in their wider implementation in practice.

~~Mathematical Modeling  
the Electrical Activity of  
the Heart ...~~

Due to its complexity and importance, cardiac mechanics has been

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studied extensively both experimentally and through mathematical models and simulation.

Models of cardiac mechanics evolved from seminal studies in skeletal muscle, and developed into cardiac specific, species specific, human specific and finally patient specific calculations.

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~~A short history of the  
development of  
mathematical models ...~~

Mathematical modeling  
of heart provides a better  
understanding for the  
complex biophysical  
phenomena related to  
electrical activity in the  
heart. Various  
electrophysical models  
have - been developed to  
simulate electrical  
properties of cardiac

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tissue. In this research work monodomain model which is coupled with the single cell FitzHugh-Nagumo model is used to simulation the electrical activities.

## ~~1 INTRODUCTION~~

### ~~USER~~

This mathematical modelling of cardiac electrical activity, as one

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of the most operational  
sellers here will agreed be  
in the midst of the best  
options to review.

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simple site that provides  
access to tons of free  
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different categories. It is  
believed to be one of the  
major non-torrent file  
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**Mathematical Modelling**

*Page 29/37*

# Read Online Mathematical ~~Modeling Of~~ Cardiac Electrical Activity

For models aimed at EP computational simulation, once the anatomy and structure of the heart have been defined, a mathematical model that simulates the EP behaviour of the myocardium must be plugged in. Figure 9 briefly summarises the main methods and

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options to model the  
cardiac EP using EP  
models.

## Electrical

~~Three-dimensional  
cardiac computational  
modelling: methods ...~~

Example of mathematical  
modelling of electrical  
system for series RLC  
circuit.

~~Mathematical Modelling  
of Electrical System~~

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Due to the extreme complexity of cardiac tissue and its intrinsic nonlinear dynamics, mathematical and computational modelling played (and continue to play) a crucial role in unveiling multiscale emerging phenomena and explaining both regular, and irregular behaviour, up to the



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description of life-threatening arrhythmias and fibrillation patterns.

## Electrical

~~Effective mathematical modelling of fractional-diffusion ...~~

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may not be available for  
up to 4 hours.

## ~~Mathematically Modelling the Electrical Activity of the Heart~~

All mathematical models  
of cardiac cellular  
electrophysiology are  
based, at least in part, on  
the seminal  
electrophysiological  
work of Hodgkin and  
Huxley in the giant squid

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axon, which quantified the ionic mechanisms underlying the neuronal AP. Based on their work, the cellular AP can be conceptualized as a momentary, active change in the transmembrane electrical potential (the difference between intracellular and extracellular electrical potentials) of an excitable membrane that occurs ...

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Frontiers | Mathematical  
models of cardiac  
pacemaking ...

Mathematical modelling  
of drug-ion channel  
interactions for cardiac  
safety assessment

Abstract: Unintended  
drug interactions with  
ion channels in cardiac  
cells can alter normal  
electrical activity in the  
heart.

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