Nasir Ganikhodjaev
Farrukh Mukhamedov
Pah Chin Hee

VOLUME 1

$$x' = 2xy$$
$$y' = 2xz$$

INVESTIGATIONS ON PURE MATHEMATICS, FINANCE MATHEMATICS AND OPTICS

Proceedings of the Department of Computational and Theoretical Sciences Kulliyyah of Science, IIUM

$$\varphi_1(x, y, z) = z$$

$$z' = x^2 + y^2 + z^2 + 2yz$$

الجامعة الإسلامية العالمية ماليزيا
INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA
يونيورسيتي إسلام انتارابغسا ملايسيا

Investigations on Pure Mathematics, Finance Mathematics and Optics

Nasir Ganikhodjaev
Farrukh Mukhamedov
Pah Chin Hee

IIUM Press

Published by.
IIUM Press
International Islamic University Malaysia

First Edition, 2011

Perpustakaan Negara Malaysia Cataloguing-in-Publication Data

Nasir Ganikhodjaev, Farrukh Mukhamedov & Pah Chin Hee Investigations on Pure Mathematics, Finance Mathematics and Optics

ISBN: 978-967-418-198-7

Member of Majlis Penerbitan Ilmiah Malaysia – MAPIM
(Malaysian Scholarly Publishing Council)

Printed by
IIUM PRINTING SDN.BHD.
No 1, Jalan Industri Batu Caves 1/3
Taman Perindustrian Batu Caves
Batu Caves Centre Point
68100 Batu Caves
Selangor Darul Ehsan

Contents

Preface

Part I Pure Mathematics Concentration

Chapter 1	THE BEHAVIOR OF TRAJECTORY OF ξ^s QUADRATIC STOCHASTIC OPERATIONS	2
Chapter 2	THEORY OF MARKOV CHAINS IN PEDIATRIC DISEASES	8
Chapter 3	ON NONLINEAR DYNAMIC SYSTEMS ARISING IN POTTS MODEL	14
Chapter 4	THE FIRST RETURN TIME AND DIMENSION	22
Chapter 5	ON AS SOCIATIVE ALGEBRAIC STRUCTURE OF GENETIC INHERITANCE	31
Chapter 6	INTERACTING PARTICLE SYSTEM	37
Chapter 7	DYNAMICS OF GENERALIZED LOGISTIC MAPS	43
Chapter 8	GEOMETRIC BROWNIAN MOTION AND CALCULATION OF OPTION PREMIUM IN BLACK SCHOLES MODEL	50
Chapter 9	ON THE ELEMENTARY CHARACTEFIZATION OF PRIMES IN PRIMALITY TESTS: TWO SHORT STUDIES.	57
Chapter 10	ON ASSOCIATIVE ALGEBRAIC STRTJCTURE OF GENETIC INHERITANCE	64
Chapter 11	SOME APPLICATION OF ERGODIC THEORY IN NUMBER THEORY	70
Chapter 12	STUDY OF ROLES OF EXTERNAL MAGNETIC FIELD ON ISING AND POTTS MODEL	76
Chapter 13	INVESTIGATION OF STABILITY OF FIXED POINTS OF NONLINEAR DISCRETE DYNAMICAL SYSTEMS	82
Chapter 14	MARKOV CHAINS AND ITS APPLICATION: THE INVENTORY MODEL	90
Chapter 15	PHASE TRANSITION FOR ISING MODEL WITH TWO COMPETING INTERACTION ON CAYLEY TREE OF ORDER 4	96
Chapter 16	LIMIT BEHAVIOR OF DYNAMIC SYSTEMS CORRESPONDING TO LATTICE MODELS WITH COMPETING PROLONGED AND ONE-LEVEL BINARY INTERACTIONS	101
Chapter 17	ASSOCIATIVE ALGEBRA IN GENETIC INHERITANCE	109
Chapter 18	ON ξ^a- QUADRATIC STOCHASTIC OPERATORS AND THEIR CLASSIFICATIONS	115

Part II Finance Mathematics Concentration

Chapter 19	ANALYZING THE PERFORMANCE OF INVESTMENT STRATEGY OF EPF	123
Chapter 20	PREDICTION OF STOCK PRICE USING NEURAL NETWORK	130
Chapter 21	COMPARISON BETWEEN CONVENTIONAL AND ISLAMIC BOND IN MALAYSIA	136
Chapter 22	STOCK PERFORMANCE ANALYSIS BETWEEN MALAYSIAN AIRLINES SYSTEM BERHAD AND AIRASIA BERHAD	144
Chapter 23	ISLAMIC PAWNBROKING (AR-RAHNU) AS A MICRO CREDIT INSTRUMENT IN MALAYSIA	151
Chapter 24	ANALYSIS OF CRUDE PALM OIL FUTURES PRICES TRADED ON BURSA MALAYSIA	160
Chapter 25	AN EMPIRICAL STUDY ON THE EFFICIENCY OF THE TRIM AND FILL METHOD IN CORRECTING PUBLICATION BIAS IN META ANALYSIS	166
Chapter 26	PERFORMANCE ANALYSIS OF INSURANCE AND TAKAFUL INDUSTRIES IN MALAYSIA	171
Chapter 27	ANALYSIS OF DATA USING MULTILEVEL MODELLING WITH MLwiN	179
Chapter 28	FINANCIAL PERFORMANCE OF' ISLAMIC BANKING AND CONVENTIONAL BANKING IN MALAYSIA	186
Chapter 29	A STUDY ON THE EFFECT OF PUBLICATION BIAS IN META ANALYSIS	194
Chapter 30	RATIO ANALYSIS: BANK ISLAM MALAYSIA BERHAD (BIMB) & MALAYAN BANKING BERHAD (MAYBANK)	201
Chapter 31	AN ANALYSIS OF MALAYSIAN UNIT TRUST FUNDS: ISLAMIC VS CONVENTIONAL	207

Part III Optics Concentration

Chapter 32	QUANTUM TRAJECTORY METHOD USING MPI PARALLEL COMPUTING	214
Chapter 33	LINEAR WAVE PROPAGATION IN SINGLE MODE OPTICAL FIBRE	220
Chapter 34	THE OPTICAL RAY TRACING TECHNIQUE IN LENS SYSTEM WITHIN AND BEYOND PARAXIAL APPROXIMATION	226
Chapter 35	WAVE PROPAGATION IN NONLINEAR AND HOMOGENEOUS MEDIA· KERR MEDIA	234
Chapter 36	MATRIX METHODS OF OPTICAL RESONATORS	240

THEORY OF MARKOV CHAINS IN PEDIATRIC DISEASES

Ahmad Saadi Kamaruddin
Prof. Dr. Nasir Ganikhodjaev

Abstract. *Many people label any problem that appears to be inherited a "genetic disease". However, though there are legitimate genetic diseases, there are also a variety of problems that have an inherited component, but are of a fundamentally different nature. Dealing effectively with any genetic problem requires an understanding of the relationship between the genes (genotype) and the phenotype. Therefore, the main objective of my study is to study the behavior of genetic diseases transmission from parents to their children. Some of these genetic diseases are life threatening and can lead to death to the effected kids.*

1 Introduction

We will consider an application the theory of Markov Chains in pediatric genetic diseases. It is well known that the gene of the parents determine the gene of the child. This means that parents' genetic diseases can be transmit to the children for example asthma, thalassaemia, hepatitis, and diabetes. In connection with these statistics we construct following two Markov chain. First Markov chain describes the transmission from father to his sons, second Markov chain describes the transmission from mother to her daughters.

Let N=(Nf, Nm) be the number of considering families. Here Nf=Nm, we consider the Markov chains with transition probabilities matrices $\prod(F,S)$ and $\prod(M,D)$

A Markov system (or Markov process or Markov chain) is a system that can be in one of several (numbered) states, and can pass from one state to another each time step according to fixed points.

If a Markov system is in state i, there is a fixed probability, p_{ij}, of it going into state j the next time step, and p_{ij} is called a transition probability.

A Markov system can be illustrated by means of a state transition diagram, which is a diagram showing all the states and transition probabilities. (See example opposite.)

The matrix P whose ijth entry is p_{ij} is called the transition matrix associated with the system. The entries in each row add up to 1. Thus, for instance, a 2×2 transition matrix P would be set up as in the following figure 1.1.

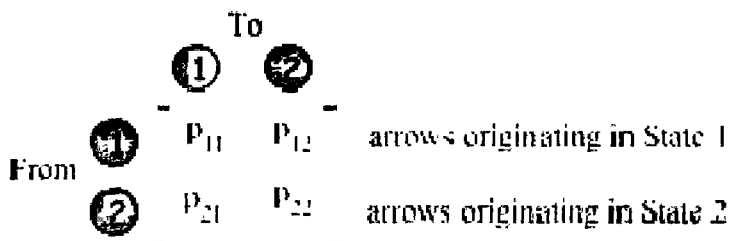

Figure 1.1. Transition matrix

1.1 Properties of Markov chain

Define the probability of going from state *i* to state *j* in *n* time steps as