

Nasir Ganikhodjaev
Farrukh Mukhamedov
Pah Chin Hee

VOLUME 1

INVESTIGATIONS ON PURE MATHEMATICS, FINANCE MATHEMATICS AND OPTICS

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



الجامعة الإسلامية العالمية ماليزيا
INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA
يُونَيْتِي اِسْلَام اِنْتَارَاغْسِيَا مِلَيْسِيَا

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
©IIUM Press, IIUM

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without any prior written permission of the publisher.

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 |

AN EMPIRICAL STUDY ON THE EFFICIENCY OF THE TRIM AND FILL METHOD IN CORRECTING PUBLICATION BIAS IN META ANALYSIS

Norizzati Mohd Nasir
Assist. Prof. Dr. Nik Ruzni Nik Idris

Abstract. *This project paper examines the efficiency of “Trim and Fill” method in correcting publication bias in meta-analysis under different scenarios. Data of meta-analysis is simulated and Fixed Effect model is used to estimate the effect size and standard error. The assessment is based on the relative bias of effect estimates and corresponding standard errors from the complete meta-analysis data versus corrected meta-analysis data. The objective of this project paper is to explore the scenarios where the Trim and Fill method is best utilized.*

1 Introduction

This paper examines the efficacy of funnel plot and trims and fills method for detecting for correcting publication bias for different degrees of publication bias. These methods were applied to the hypothetical simulated Meta-analysis data under different scenarios with pre-assigned parameters. The parameters were used in two scenarios;

- I. numbers of studies included in the meta-analysis for $N=10, 20, 30$
- II. the percentages of unreported studies for $x=10\%, 30\%, 50\%$.

1.1 Generation of Meta-Analysis data with no publication bias

The first procedure and assumptions is generating hypothetical meta-analysis data with no publication bias. These analyses of continuous data are created by simulating N treatment effect sizes, denoted Y_i and the corresponding variances denoted $V(Y_i)$. These values were generated using the normally distributed random number generator with the following assumptions;

- I. studies with smaller sample size n , tend to have greater variability and larger effect size
- II. studies with larger sample size n , has a lower variability and smaller effect sizes, i.e effect size closer to the overall effect size

1.1.1 Estimation of overall effect size and its corresponding SE

Estimation of the overall effect size, denoted \hat{Y}_{all} and its corresponding SE, denoted \widehat{SE}_{all} , were computed from the complete meta-analysis generated using the inverse variance method. To estimate the \hat{Y}_{all} equation is used, while to estimate the standard error, \widehat{SE}_{all} equation is used.

1.2 Creation of publication bias

To create the publication bias, we select, at random studies with less significant or negative effect sizes from smaller studies which are represented on the lower left-hand side of the