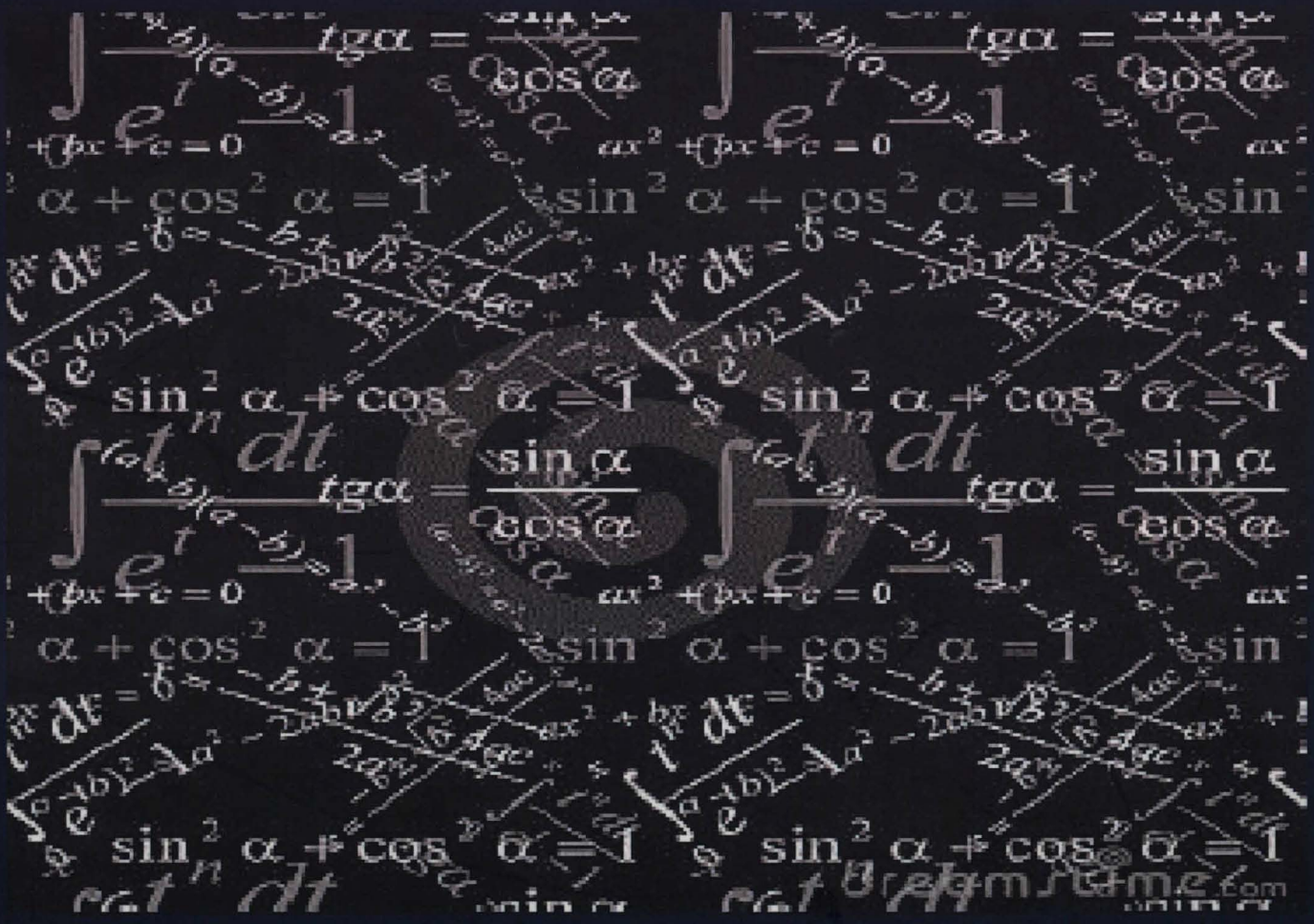
الجامعة الإسلامية العالمية ماليزيا
INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA
يونيرسيتي إسلام انتارابغسا ملسيا

VOLUME 2

RECENT ACHIEVEMENTS IN DYNAMICAL SYSTEMS

Proceedings of Department of Computational and Theoretical Sciences, Faculty of Science, IIUM



Chief Editor : Farrukh Mukhamedov
Editors : Nasir Ganikhodjaev
: Mansoor Saburov

Proceedings of Department of
Computational and Theoretical Sciences,
Faculty of Science, IIUM

Recent Achievements in Dynamical Systems

Chief Editor: Farrukh Mukhamedov

Editors:
Nasir Ganikhodjaev
Mansoor Saburov

Vol. 2

IIUM Press

Published by:
IIUM Press
International Islamic University Malaysia

First Edition, 2011

Perpustakaan Negara Malaysia Cataloguing-in-Publication Data

Farrukh Mukhamedov, Nasir Ganikhodjaev & Mansoor Saburov
Recent Achievements in Dynamical Systems
Farrukh Mukhamedov, Nasir Ganikhodjaev & Mansoor Saburov

ISBN: 978-967-418-201-4

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

Part I. Quadratic Operators and Their Dynamics

Part II. Dynamical Systems Arising From Physical Models

SINGLE POLYGON COUNTING FOR TWO FIXED NODES ON A CAYLEY TREE OF ORDER 2

Pah Chin Hee[3]

Department of Computational and Theoretical Sciences, Faculty of Science, IIUM, Kuantan, Malaysia
E-mail: [1]*pahchinhee@gmail.com*

Abstract

We have found an exact formula for a single polygon counting problem on Cayley tree of order 2, which the polygon contain 2 fixed vertices with a constraint. The solution is elementary based on Catalan numbers. Some identities of the solution have been established which associate with Catalan numbers.

Keywords: *Cayley tree, Catalan numbers, Single polygon counting*
Mathematics Subject Classification : 82B20, 11B83.

Introduction

In the study of computer science, tree model appears very often and attracted a lot of attention of researchers [1,2]. In a Cayley tree of order 2 [3], we denote V the set of all vertices of the Cayley tree, we fixed 2 vertices, namely $x^0, x^* \in V$. There is only a single shortest path connecting the two vertices as it is in a tree. Let l denote the number of the vertices along the shortest path, where $l \in V$. In this paper, we would like to find the number of different connected component containing these two fixed vertices as well as the vertices along the shortest path for a given n number of vertices. We call this connected component a "polygon" [4,5]. In network theory, the scenario stated above is identical to setting up 2 gateway with distance l nodes (shortest path), each gateway is allowed to expand in a rooted tree. These nodes are connected by using fiber optics or simple phone line. In this problem, each router is maximally connected to 3 network components (not end user). The problem statement is how many different ways we can arrange the network with given n routers (nodes). ation. For example, in figure below: Recall that a Cayley tree of order 2, denoted as Γ^2, is a graph with no cycles, each vertex emanates 3 edges. We denote the set of all vertices as V and denote the set of all edges as L, i.e., $\Gamma^2 = (V, L)$. Let C_r be r-th Catalannumbers [6,7,8] which