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

Part II Finance Mathematics Concentration

Part III Optics Concentration

DYNAMICS OF GENERALIZED LOGISTIC MAPS

Intan Nurul Dayana Alladad
Assoc. Prof. Dr. Farrukh Mukhamedov

Abstract. *This thesis is written to discuss the dynamics of generalized logistic maps. We consider such kind of logistic maps* $f(x) = x(1 - x^2)$ *and* $f(x) = x(1 - x^2)$. *The function* $f(x) = x(1 - x^2)$ *has a unique fixed point and it has two periodic points of period two. The fixed point is a neutral fixed point and both of the periodic points are repelling. The function* $f(x) = x(1 - x^2)$ *has three fixed points and it has six periodic points of period two. The behaviour of fixed points and periodic points are attracting, repelling and neutral in a certain range.*

1 Function $f(x) = x(1 - \mu x^2)$

Devoted to investigate about the function

$$f(x) = x(1 - \mu x^2), \mu > 0,$$

We will find the fixed points, the periodic points, eventually fixed points, and the behaviour of the fixed and periodic points.

1.1 Fixed Points

First of all, we have to find the fixed points of $f(x) = x(1 - \mu x^2)$.The fixed points are given by following equation $f(x) = x$. Hence we have

$$x(1 - \mu x^2) = x$$
$$x(1 - \mu x^2 - 1) = 0$$

Solving equation above we have,

$$x = 0 \text{ or } 1 - \mu x^2 - 1 = 0$$

therefore

$$-\mu x^2 = 0 \text{ or } x = 0$$

So we get $x = 0$ as a unique fixed point of $f(x) = x(1 - \mu x^2)$.

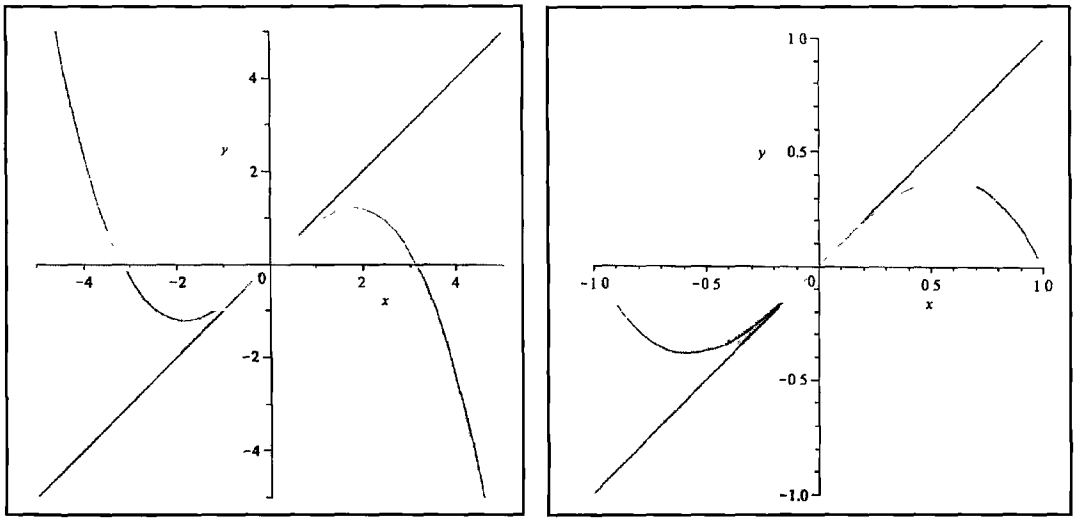

Figure 1.1: Fixed point when $\mu = 0.1$ and $\mu = 1$ show that the fixed point is 0.