Salwa Akl

بسم اللّه الرحمن الرحيم

مركز الشبكات وتكنولوجيا المعلومات

قسم التوثيق الإلكتروني

Salwa Akl

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم باللّه العظيم أن المادة التي تم توثيقها وتسجيلها

علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

Salwa Akl

بعض الوثائق الأصلية تالفة
وبالرسالة صفحات لم ترد بالأصل

CELLULAR FOLDING OF SURFACES TO A POLYGON

A THESIS

SUBMITTED TO THE DEPARTMENT OF MATHEMATICS

Faculty of Science, Tanta University

For the Degree of Master in Science

In

(PURE MATHEMATICS)

By

MOHAMMED RAMADAN EBRAHIM ZEEN EL-DEEN

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Faculty of Science

Department of Mathematics

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SUPERVISORS

Prof. Dr.

ENTESAR MOHAMMAD EL-KHOLY,

Professor of Pure Mathematics,
Faculty of Science,
Tanta University

Dr.

FATMA ABDALLA HASSAN,

Lecture of Pure Mathematics,
Faculty of Science,
Tanta University

Head of Mathematics Department

M. Beltagy

(Prof. Dr. M. Beltagy **)**

CURRICULUME VITAE

Name	:	Mohammed Ramadan Ebrahim Zeen El-Deen
Date of Birth	:	7/7/1970.
Locality	:	Seperbay, Tanta, Ghrabia.
Nationality	:	Egyptian.
Primary School	:	El-Kholy Primary School (1982).
Preparatory School	:	Seperbay Preparatory School (1985).
Secondary School	:	Sadk El-Rafey Secondary School (1988).
University	:	Faculty of Science, Tanta University (1992).

Head of Mathematics Department

M Beltagy

(Prof. Dr. M. Beltagy

POSTGRADUATE STUDIES

The present thesis is submitted to Tanta University in partial fulfillment of requirements of the degree of Master of Science in Pure Mathematics. Beside the research work introduced in this thesis, the candidate has attended four postgraduate courses within two academic years including the following courses:

1- Abstract Algebra.

2- Numerical Analysis.

3- Partial Differential Equations.

4- Functional Analysis.

5- German Language.

The applicant Mohammed Ramadan Ebrahim Zeen El-Deen has successfully passed the final examinations (1993-1994) of these courses.

Head of Mathematics Department

M Beltagy

(Prof. Dr. M. Beltagy

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My passion, love gratitude,... to my parents, they always give me sincerely and endlessly in return for nothing.

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Mohammed Ramadan

CONTENTS

CELLULAR FOLDING OF SURFACES TO A POLYGON

BY

MOHAMMED RAMADAN EBRAHIM ZEEN EL-DEEN

ABSTRACT

In this thesis we have developed the theory of certain continuous maps $f : M \to P_n$ of such a surface M onto an n-sided polygon P_n. These maps are cellular folding. Then we obtained the relationship between the genus of M and the number n, either M is orientable or not.

For regular cellular folding of orientable surface of genus $g > 1$ we proved that $n \leq 2g + 2$, and of nonorientable surface $n \leq g + 2$.

INTRODUCTION

INTRODUCTION

The category of CW-complexes is one of the most useful categories of topological spaces. CW-complexes have sufficiently nice local properties so that the most pathological situations are avoided, yet they are sufficiently general to include most spaces we need to consider in the thesis. These spaces are build up by successivelly attaching cells by arbitrary continuous maps.

The regular CW-complexes form a special category of CW-complexes which share with more general CW-complexes the advantage that often a space can be represented as a regular CW-complex with many fewer cells than in a simplicial decomposition.

Now, let M be a compact surface, $f : M \to P_n$ be a continuous map onto an n-sided polygon P_n. These maps are called cellular, regular, foldings under certain conditions.

The aim of this thesis is to explore the relationship between the genus of M and the number n, either M is orientable or not.

The thesis consists of three chapters. The goal of **the first chapter** is to classify the compact connected topological 2-manifolds without boundary, surfaces. This to be done we needed to give first the idea about complexes, surfaces, connected sum, triangulations and orientation of manifolds.

Chapter two is dealing with regular CW-complexes. To discuss with these spaces we need first to give an idea about cell complexes, cell decomposition and CW-complexes. Also to be able to discuss the properties of cellular foldings we gave an idea about cellular maps and how to colour the graphs by either colouring the vertices or the edges.

In general a continuous map $f : K \to L$ from a CW-complex K to another L is a cellular folding iff it maps i-cells of K to i-cells of L such that the closure of any cell e and its image f(e) must contains n distinct vertices.

Chapter three is presented for cellular, regular, folding over an n-sided polygon, consequently it is need first to discuss cellular, regular, foldings and its properties. Then we obtained the relationship between the genus of M and the number n. Also we proved that for a regular cellular folding of an orientable surface of genus $g > 1$, we have $n \leq 2g + 2$ and for a nonorientable surface $n \leq g + 2$.