

**THE COMPARISM BETWEEN QUADRATIC
TRIGOMOMETRIC B-SPLINE AND CUBIC TRIGONOMETRIC
BEZIER CURVES IN DESIGNING 2-DIMENSIONAL
MUQARNAS PATTERN**

AUNI ARDINI BINTI ADDY AZHAR

**Thesis Submitted in Fulfilment of the Requirement for
Bachelor of Science (Hons.) Mathematical Modelling and Analytics
College of Computing, Informatics and Mathematics
Universiti Teknologi MARA**

August 2023

ABSTRACT

Quadratic Trigonometric B-spline and Cubic Trigonometric Bezier curves are two methods to produce smooth attractive curves in computer graphics and design. These methods have same control points which is 4 control points. The object used in this research is Muqarnas pattern. The Mathematica tools are used in this research for produce the Muqarnas pattern. In this report, the comparison, in between two methods are determined which is the best method between two methods, the Muqarnas pattern by using Mathematica are produced same with actual picture of Muqarnas pattern. For, Cubic Trigonometric Bezier Curves, the curves obtained by adjusting the shape of parameters to get the desires Muqarnas pattern. Designers and graphics experts may use these curve types to their advantage to produce accurate and aesthetically pleasing curves in a variety of applications by knowing their properties and behaviour.

ACKNOWLEDGEMENT

First and foremost, praises and thanks to Allah because of His Almighty and His utmost blessings throughout my research, enable to finish this research within the time duration given for blessing with many great people around me.

I am immensely grateful to my supervisor, Madam Nursyazni Binti Mohamad Sukri, for their unwavering support, invaluable guidance, and continuous encouragement throughout the project. Their expertise, insightful feedback, and dedication have been instrumental in shaping the direction and quality of this work.

I would also like to thank my family and friends for their love, encouragement, and understanding during this challenging yet fulfilling journey. Their unwavering belief in my abilities has been a constant motivation for me to strive for excellence.

Thank you all for being an integral part of my journey.

TABLE OF CONTENTS

DECLARATION BY THE SUPERVISOR-----	i
DECLARATION BY THE CANDIDATE-----	ii
ABSTRACT -----	iii
ACKNOWLEDGEMENT -----	iv
TABLE OF CONTENTS -----	v
LIST OF TABLES -----	viii
LIST OF FIGURES -----	ix
CHAPTER 1 INTRODUCTION OF RESEARCH-----	1
1.1 Introduction-----	1
1.2 Background of Study -----	1
1.3 Problem Statement-----	4
1.4 Objectives -----	5
1.5 Significance of the Project-----	5
1.6 Scope of the Project -----	6
1.7 Project Benefits -----	6
1.8 Definition of Terms and Concept -----	7
1.9 Organization of Report-----	8
CHAPTER 2 LITERATURE REVIEW-----	10
2.1 Introduction -----	10
2.2 Literature Review -----	10
2.3 Conclusion -----	12
CHAPTER 3 METHODOLOGY-----	14

3.1	Introduction	14
3.2	Research Step	14
3.3	Quadratic Trigonometric B-spline	18
3.3.1	Basis of Quadratic Trigonometric B-Spline	18
3.3.2	Geometric Properties of Quadratic Trigonometric B-spline	19
3.3.3	Curve behaviour for Quadratic Trigonometric B-spline	21
3.4	Cubic Trigonometric Bezier Curves.	22
3.4.1	Basis Of Cubic Trigonometric Bezier Curves.	22
3.4.2	Geometric Properties of Cubic Trigonometric Bezier Curves	23
3.4.3	Shape parameters of Cubic Trigonometric Bezier Curves	23
3.5	Curve behaviour using interactive application in <i>mathematica</i>	26
3.6	Conclusion	27
CHAPTER 4 IMPLEMENTATION		28
4.1	Introduction	28
4.2	Implementation of Quadratic Trigonometric B-spline and Cubic	28
4.3	Conclusion	33
CHAPTER 5 RESULT AND DISCUSSION		34
5.1	Introduction	34
5.2	Result and analysis	34
5.3	Result and analysis for Quadratic Trigonometric B-spline	34
5.4	Result and analysis for Cubic Trigonometric Bezier Curves	35
5.4.1	Basis of Cubic Trigonometric Bezier Curves	35
5.4.2	Curves behaviour of Cubic Trigonometric Bezier Curves	37