

# Grid Method Classification of Islamic Geometric Patterns

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## ABSTRACT

This paper proposes a rational classification of Islamic Geometric Patterns (IGP) based on the Minimum Number of Grids (MING) and Lowest Geometric Shape (LGS) used in the construction of the symmetric elements. The existing classification of repeating patterns by their symmetric groups is in many cases not appropriate or prudent [Joy97]. The symmetry group theories do not relate to the way of thinking of the artisans involved, and completely has ignored the attributes of the unit pattern and has focused exclusively on arrangement formats. The paper considers the current symmetric group theories only as arrangement patterns and not as classifications of IGP since they have a "global approach" and have failed to explore the possibilities in the construction elements of IGP. The Star, a central Rosette, which is the most important element of IGP, forms the core of our study. The paper proposes new nomenclature to be used in the description of the unit pattern based on the MING and LGS used in the construction of a Star/Rosette pattern that can be used to achieve the final design. We describe and demonstrate procedures for constructing Star/Rosette unit patterns based on our proposed classification in a grid formation dictated by the final design of the unit pattern.

**Keywords :-** IGP, MING, LGS, Grid, Classification, Group Theory, Star/Rosette.

## 1. INTRODUCTION

Islamic artisans began to adorn the surfaces of palaces, mosques and minarets with IGPs more than thousand years ago [Sai76]. The geometric designs consistently filled the surface planes with star-shaped like regions that resulted in very highly visual symmetric patterns, which would henceforth be referred to as "Islamic Geometric Patterns". These geometric patterns have often presented a long-standing historic awe to group theorists who have endeavoured to present a prudent classification of these structures. Many attempts that have been made to classify the Star/Rosette patterns have resulted in a wide variety of construction groups and classifications. Grünbaum and Shephard tried to decompose these geometric patterns by their symmetry groups after obtaining the base region,

which they had used to arrive at the properties of the original pattern [Gru92]. European group theorists like Densdney have proposed a classification based on reflecting lines off to periodically placed circles [Den93]. Lee has presented simple constructions for the common features of IGPs but has failed to present a benchmark classification theorem [Lee95]. Also one important aspect of IGPs that has failed to attract any kind of classification is the naïve extension of lines into interstitial regions. We have had a good look into the existing complexity to the inferred geometry in order to describe the relation of the extension region with the unit pattern. S.J. Abbas and A. Salman in their landmark thesis on *A Symmetries of Islamic Geometrical Patterns* were of a firm opinion that no worthwhile classification of IGPs has been taken up to this day with specific focus on their construction [Abb95]. This paper presents an argument that popular and existing symmetry groups like the "7-fricce groups" and the "17-wallpaper groups" are purely base models. A more finer and refined classification based on the study of the construction of the unit pattern is required with specific focus on the gridding system of the unit pattern. The accomplishment of the unit pattern by the MING, LGS and the infinite number of possibilities this classification presents by way of permutations and combinations of the grids are huge.

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# Grid Method Classification Of Islamic Geometric Patterns

**Annelies Wilder-Smith**



## **Grid Method Classification Of Islamic Geometric Patterns:**

*Geometric Modeling: Techniques, Applications, Systems and Tools* Muhammad Sarfraz, 2013-03-09 Computer Aided techniques Applications Systems and tools for Geometric Modeling are extremely useful in a number of academic and industrial settings Specifically Computer Aided Geometric Modeling CAGM plays a significant role in the construction of signing and manufacturing of various objects In addition to its critical importance in the traditional fields of automobile and aircraft manufacturing shipbuilding and general product design more recently the CAGM methods have also proven to be indispensable in a variety of modern industries including computer vision robotics medical imaging visualization and even media This book aims to provide a valuable source which focuses on interdisciplinary methods and affiliate research in the area It aims to provide the user community with a variety of Geometric Modeling techniques Applications systems and tools necessary for various real life problems in the areas such as Font Design Medical Visualization Scientific Data Visualization Archaeology Toon Rendering Virtual Reality Body Simulation It also aims to collect and disseminate information in various disciplines including Curve and Surface Fitting Geometric Algorithms Scientific Visualization Shape Abstraction and Modeling Intelligent CAD Systems Computational Geometry Solid Modeling v Shape Analysis and Description Industrial Applications The major goal of this book is to stimulate views and provide a source where researchers and practitioners can find the latest developments in the field of Geometric Modeling

**Islamic Geometric Patterns** Jay Bonner, 2017-08-17 The main focus of this unique book is an in depth examination of the polygonal technique the primary method used by master artists of the past in creating Islamic geometric patterns The author details the design methodology responsible for this all but lost art form and presents evidence for its use from the historical record both of which are vital contributions to the understanding of this ornamental tradition Additionally the author examines the historical development of Islamic geometric patterns the significance of geometric design within the broader context of Islamic ornament as a whole the formative role that geometry plays throughout the Islamic ornamental arts including calligraphy the floral idiom dome decoration geometric patterns and more and the underexamined question of pattern classification Featuring over 600 beautiful color images *Islamic Geometric Patterns Their Historical Development and Traditional Methods of Construction* is a valuable addition to the literature of Islamic art architecture and geometric patterns This book is ideal for students and scholars of geometry the history of mathematics and the history of Islamic art architecture and culture In addition artists designers craftspeople and architects will all find this book an exceptionally informative and useful asset in their fields Jay Bonner is an architectural ornamentalist and unaffiliated scholar of Islamic geometric design He received his MDes from the Royal College of Art in London 1983 He has contributed ornamental designs for many international architectural projects including the expansion of both the al Masjid al Haram Grand Mosque in Mecca and the al Masjid an Nawabi Prophet's Mosque in Medina as well the Tomb of Sheikh Hujwiri in Lahore and the Ismaili Centre in London to name but a few He is committed to the revitalization of Islamic

geometric design through the teaching of traditional methodological practices To this end in addition to publishing Jay Bonner has lectured and taught design seminars at many universities and conferences in North America Europe North Africa and Asia

**Intelligent Computer Graphics 2010** Dimitri Plemenos,Georgios Miaoulis,2010-12-01 Nowadays intelligent techniques are more and more used in Computer Graphics in order to optimise the processing time to find more accurate solutions for a lot of Computer Graphics problems than with traditional methods or simply to find solutions in problems where traditional methods fail The purpose of this volume is to present current work of the Intelligent Computer Graphics community a community growing up year after year This volume is a kind of continuation of the previously published Springer volumes Artificial Intelligence Techniques for Computer Graphics 2008 and Intelligent Computer Graphics 2009 2009 This volume contains selected extended papers from the last 3IA Conference 3IA 2010 which has been held in Athens Greece in May 2010 This year papers are particularly exciting and concern areas like rendering viewpoint quality data visualisation vision computational aesthetics scene understanding intelligent lighting declarative modelling GIS scene reconstruction and other important themes

Image Analysis and Recognition Aurélio Campilho,Mohamed Kamel,2006-09-13 ICIAR 2006 the International Conference on Image Analysis and Recognition was the third ICIAR conference and was held in P ova de Varzim Portugal ICIARisorganizedannually andalternatesbetweenEuropeandNorthAmerica ICIAR 2004 was held in Porto Portugal and ICIAR 2005 in Toronto Canada The idea of o ering these conferences came as a result of discussion between researchers in Portugal and Canada to encourage collaboration and exchange mainlybetweenthesetwocountries butalsowiththeopenparticipationofother countries addressing recent advances in theory methodology and applications The response to the call for papers for ICIAR 2006 was higher than the two previous editions From 389 full papers submitted 163 were nally accepted 71 oral presentations and 92 posters The review process was carried out by the Program Committee members and other reviewers all are experts in various image analysis and recognition areas Each paper was reviewed by at least two reviewers and also checked by the conference Co chairs The high quality of the papers in these proceedings is attributed rst to the authors and second to the quality of the reviews provided by the experts We would like to thank the authors for responding to our call and we wholeheartedly thank the reviewers for their excellent work and for their timely response It is this collective e ort that resulted in the strong conference program and high quality proceedings in your hands

**Advances in Multimedia Information Processing - PCM 2008** Yueh-Min Ray Huang,Changsheng Xu,Kuo-Sheng Cheng,Jar-Ferr Kevin Yang,M.N.S. Swamy,Shipeng Li,Jen-Wen Ding,2008-12-11 Welcome to the proceedings of 9th Pacific Rim Conference on Multimedia PCM 2008 held at the National Cheng Kung University Tainan Taiwan during Dec ber 9 13 2008 The first PCM was held in Sydney in 2000 Since then it has been held successfully around the Pacific Rim including Beijing in 2001 Hsinchu in 2002 Singapore in 2003 Tokyo in 2004 Jeju in 2005 Zhejiang in 2006 Hong Kong in 2007 and finally Tainan PCM is a major annual

international conference bringing together researchers developers and educators in the field of multimedia from around the world It covers a wide spectrum of multimedia research from state of the art theoretical breakthroughs to the practical systems of multimedia analysis and processing PCM 2008 featured a comprehensive program including tutorials keynote talks regular oral presentations special sessions and poster sessions This year we cepted 79 papers out of 210 submissions giving an acceptance rate of 37% In addition 39 papers were accepted for poster presentation The submissions were categorized into five different tracks multimedia compression communication and networking multimedia processing analysis and retrieval multimedia databases systems and applications multimedia human computer interfaces multimedia security and digital right management with a total of 210 submissions from 18 countries and regions Among the five tracks multimedia analysis and retrieval received the most submissions 34% of the submissions We kindly appreciate the great effort made by the Program Committee members and the additional reviewers in the reviewing of submissions

**Emerging Trends in ICT for Sustainable Development** Mohamed Ben Ahmed,Sehl Mellouli,Luis Braganca,Boudhir Anouar Abdelhakim,Kwintiana Ane Bernadetta,2021-01-23 This book features original research and recent advances in ICT fields related to sustainable development Based the International Conference on Networks Intelligent systems Computing Environmental Informatics for Sustainable Development held in Marrakech in April 2020 it features peer reviewed chapters authored by prominent researchers from around the globe As such it is an invaluable resource for courses in computer science electrical engineering and urban sciences for sustainable development This book covered topics including Green Networks Artificial Intelligence for Sustainability Environment Informatics Computing Technologies

**The Topkapi Scroll** Gülru Necipoğlu,1996-03-01 Since precious few architectural drawings and no theoretical treatises on architecture remain from the premodern Islamic world the Timurid pattern scroll in the collection of the Topkapi Palace Museum Library is an exceedingly rich and valuable source of information In the course of her in depth analysis of this scroll dating from the late fifteenth or early sixteenth century G lru Necipo lu throws new light on the conceptualization recording and transmission of architectural design in the Islamic world between the tenth and sixteenth centuries Her text has particularly far reaching implications for recent discussions on vision subjectivity and the semiotics of abstract representation She also compares the Islamic understanding of geometry with that found in medieval Western art making this book particularly valuable for all historians and critics of architecture The scroll with its 114 individual geometric patterns for wall surfaces and vaulting is reproduced entirely in color in this elegant large format volume An extensive catalogue includes illustrations showing the underlying geometries in the form of incised dead drawings from which the individual patterns are generated An essay by Mohammad al Asad discusses the geometry of the muqarnas and demonstrates by means of CAD drawings how one of the scroll s patterns could be used co design a three dimensional vault

**Government Reports Annual Index** ,1993

Government Reports Announcements & Index ,1993-11

**Andrew Young** Andrew Young,2001

*Mathematical*

*Reviews*, 1991      Arabian Geometric Patterns Pepin van Roojen, 2011 All the designs in this revised edition of the Pepin Press bestseller ARABIAN GEOMETRIC PATTERNS were originally recorded by Jules Bourgoïn in the 1870s The original designs were found in Egypt Persia now Iran and Syria They have been meticulously re drawn and digitized for this publication with special attention paid to the underlying mathematical structures used to create the designs The designs are interlocking so it is possible to create larger patterns by repeating the components      **Arabic Geometrical Pattern and Design** Jules Bourgoïn, 1973-01-01 Presents one hundred and ninety Islamic geometrical patterns and twenty eight examples of how these are used for architectural ornamentation      **DOORWAY TO ARABESQUE AND MORESQUE DESIGN** khalid selmane fares, DECORATIVE MOTIFS AND GEOMETRICAL PATTERNS WHERE POPULAR WITH ISLAMIC ARTISTS AND DESIGNERS ALL OVER THE WORLD FOR DECORATING ALMOST ANY SURFACE WHETHER WALLS OR FLOORS LAMPS OR TABLES TILES OR VASES AS ISLAM SPREAD ALL AROUND THE WORLD ISLAMIC ARTISTS COMBINED THEIR PENCHANT FOR GEOMETRY WITH EXISTING TRADITIONS CREATING A NEW AND DISTINCTIVE ART THE DEVELOPMENT OF THIS UNIQUE ART IN PART MAY HAVE BEEN DUE TO THE DISCOURAGEMENT OF IMAGES IN ISLAM ON BASIS THAT IT COULD LEAD TO IDOLATRY ISLAMIC ARTISTS DEVELOPED COMPLEX GEOMETRIC DECORATIVE DESIGNS AS WELL AS INTRICATE PATTERNS OF VEGETAL ORNAMENT AND CALLIGRAPHY SUCH AS MORESQUE AND ARABESQUE EVEN THOUGH THE GEOMETRIC PATTERNS CONSISTED OF OR WERE GENERATED FROM SUCH SIMPLE FORMS AS THE CIRCLE AND THE SQUARE THEY WERE COMBINED DUPLICATED INTERLACED AND ARRANGED IN INTRICATE COMBINATIONS BECOMING ONE OF THE MOST DISTINGUISHING FEATURES OF ISLAMIC ART THESE COMPLEX PATTERNS SEEM TO EMBODY A REFUSAL TO ADHERE STRICTLY TO THE RULES OF GEOMETRY AS MATTER OF FACT GEOMETRIC ORNAMENTATION IN ISLAMIC ART SUGGESTS REMARKABLE AMOUNT OF FREEDOM IN ITS REPETITION AND COMPLEXITY IT OFFERS THE POSSIBILITY OF INFINITE GROWTH AND ACCOMODATE THE INCORPORATION OF OTHER TYPES OF ORNAMENTATION      **Arabic geometrical patterns for dummies, Ramadan gifts!** Andrey Besedin, 2023-05-07 Want to add some Islamic flair to your home decor but need help knowing where to begin Islamic Decor Designs Ornaments and Arabic Geometrical Patterns for Dummies is the answer This detailed guide is ideal for anybody interested in incorporating traditional Islamic design features into their house or office You ll learn how to make gorgeous geometric designs intricate calligraphy and stunning decorations that reflect the rich cultural legacy of Islamic art and design with simple instructions and step by step guides This book contains advice and techniques to help you master the art of Islamic design whether you re a novice or an experienced artist You ll learn how to choose the proper materials and colors and create eye catching designs that will wow your audience Islamic Decor Designs Ornaments and Arabic Geometrical Patterns for Dummies includes everything from classic tilework and pottery to modern textiles and wallpaper You ll be inspired to make unique creations representing your distinctive style and inventiveness

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Pisan geometric patterns of thirteenth century and their islamic sources Rachel Meoli Toulmin,1977      *Pisan geometric patterns of [the] 13th century and their Islamic sources* Rachel Meoli Toulmin,

**3D Mapping of Islamic Geometric Motifs** Zahra Sayed,2017      **Pisan Geometric Patterns of [sic] Thirteenth Century and Their Islamic Sources** Rachel Meoli Toulmin,1977      *Islamic Geometric Ornaments in Istanbul* Miroslaw Majewski,2011

## **Grid Method Classification Of Islamic Geometric Patterns** Book Review: Unveiling the Power of Words

In some sort of driven by information and connectivity, the ability of words has be much more evident than ever. They have the capacity to inspire, provoke, and ignite change. Such is the essence of the book **Grid Method Classification Of Islamic Geometric Patterns**, a literary masterpiece that delves deep into the significance of words and their effect on our lives. Written by a renowned author, this captivating work takes readers on a transformative journey, unraveling the secrets and potential behind every word. In this review, we will explore the book is key themes, examine its writing style, and analyze its overall impact on readers.

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