



References:

<http://www.lec.csic.es/concurso/>

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Symmetry groups in the islamic geometric art: ornamental patterns of Konya (Turkey) and Marrakech (Morocco)

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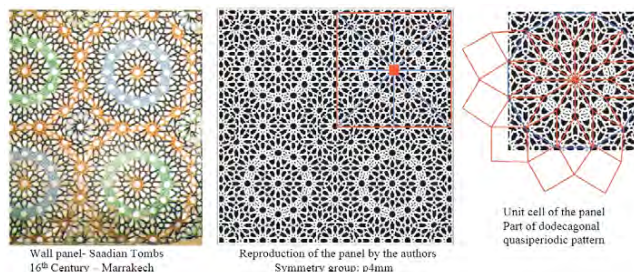
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Since the Middle Age, Muslim world has a great artistic and decorative tradition. In this vast space which were spread from Africa to Asia through Andalusia, there are treasures of unmatched beauty in the Islamic geometric art.

The skill of the master craftsmen, their knowledge of the concept of symmetry have allowed the development of this art over the centuries [1]. Indeed, symmetry is an essential tool in conceiving the ornamental patterns, regardless of their degree of complexity.

Since the end of the 19th century, many authors have been interested in Islamic ornamental motifs. In 1879, Bourgoïn compiled nearly 200 geometric patterns. The development of group theory in the 20th allowed the analysis and classification of these motifs from the point of view of symmetry. Some authors [2] have attempted to find the 17 crystallographic groups of the plane established by Fedorov. Other authors have used computer to generate ornamental patterns. Finally, the advent of quasicrystals has led scientists to study some Islamic ornamental patterns as a quasicrystalline tiling [3].

Our purpose, in this presentation, is to study the symmetry in the ornamental art of the Eastern and Western Muslim world. We consider the geometric ornamental patterns found in two millennia cities, Marrakech and Konya, founded respectively by the Almoravid in Maghreb, and the Seljuk in Asia. The richness of the ornamental patterns achieved on several supports (stone, ceramic, wood, plaster, ...) allows an easy approach of the plane crystallographic groups, perfectly suitable for the introduction of group theory in crystallography.



Wall panel- Saadian Tombs
16th Century - Marrakech

Reproduction of the panel by the authors
Symmetry group: p4mm

Unit cell of the panel
Part of dodecagonal
quasicrystalline pattern

References:

[1] Thalal. A & al. "Symmetry in art and architecture of the Western Islamic world" Crystallography Reviews, 2017.

[2] Aboufakil Y., Thalal A. & Elidrissi Raghni M.A. - Symmetry groups of Moroccan geometric woodwork patterns, J. Appl. Cryst. 2013.

[3] Makovicky E. & Makovicky N., The first find of dodecagonal quasiperiodic tiling in historical Islamic architecture. J. Appl. Cryst., 44, 569–573, 2011.

Keywords: Symmetry, crystallographic groups, Islamic geometrical art