

## MS44-P07 | CONSTRUCTION OF MUQARNAS FROM PERIODIC AND QUASIPERIODIC 2-DIM

### TILING

ABOUFADIL, Youssef (Multidisciplinary Faculty Safi, Cadi Ayyad University, Safi, MAR); Thalal, Abdelmalek (Faculty of Sciences Semlalia, Cadi Ayyad University, Marrakech, MAR); El Idrissi Raghni, My Ahmed (Faculty of Sciences Semlalia, Cadi Ayyad University, Marrakech, MAR); Jali, Abdelaziz (Faculty of Sciences Semlalia, Cadi Ayyad University, Marrakech, MAR); Oueriagli, Amane (Faculty of Sciences Semlalia, Cadi Ayyad University, Marrakech, MAR)

Moroccan geometric ornamental art encompasses great achievements in two-dimensional ornaments such as rosettes, friezes and wallpaper patterns, as well as in the three-dimensional ornament called Muqarnas (Stalactites). The Muqarnas, characteristic of Arab-Islamic art, were used by Muslim architects as decorative elements before the 10th century. The Muqarnas are made of wood, stone, stucco, marble or ceramic. The techniques of their construction and the resulting variants differ according to the regions of the Islamic world. Muqarnas art flourished in Morocco during the reign of the Almohad dynasty (between the twelfth and thirteenth century), it was among the most used architectural elements in the construction of private or religious buildings. The method of construction of the Muqarnas uses the principles of three-dimensional geometry. This is a tiling of space by a repetition of concave surface units whose, the perpendicular projection on a plane defines a tiling that can have axial symmetry (Figure 1). In this presentation, we describe the method of building Muqarnas from two-dimensional tiling. We then show how Muqarnas evolve, according to the shape and symmetry of their units, from simple to complex. Finally, we present an example of Muqarnas obtained from a two-dimensional quasi-periodic tiling.

Keywords: Symmetry, Muqarnas, Moroccan geometric art, tiling

[1] Castera JM. Arabesques, ACR Edition; 1996.

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

[3] Roxana RECIO, Antonio CORTIJO OCAÑA (orgs.). Mirabilia 22 (2016/1)

[4] Yvonne Dold-Samplonius, Practical Arabic Mathematics : Measuring the Muqarnas by al-Kashi. Centaurus 1992 : Vol. 35 : pp. 193-242.