

[DOI: 10.20472/IAC.2016.021.014](https://doi.org/10.20472/IAC.2016.021.014)

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THE “KELVIN CONJECTURE” IN MEDIEVAL ART IN THE MIDDLE EAST

Abstract:

This study brings a new outlook to the two dimensional decorative tiling in Medieval Art in the Middle East by exploring their three dimensional content in a scientific context. The results of the study suggest that the some abstract geometrical patterns used in decorative tiling are the clear evident of an ancient mathematical problem of space-filling known in the scientific literature as “Kelvin Conjecture”. Like many other theories developed on the issue by a number of well-known thinkers such as Plato, Aristoteles, Pappus, Ibn Al-Salah, Ibn Rushd, and Kepler throughout history right up to the present day, “Kelvin Conjecture” explores simply the answer to the problem of most efficient space-filling arrangement of similar cells of equal volume with minimum surface area. In 1887, Lord Kelvin proposed that the fourteen-face truncated octahedron with a slight curvature of the hexagonal faces was the most efficient form. Although it was outdated by the Weaire-Phelan structure discovered in 1993, the conjecture is still of the interest in the field of science investigating if there is a more efficient solution. Hence, in this study, by analyzing various examples of this particular tiling composed of superposed octagons as suggested by Hankin in 1905, it is concluded that the layout of these two dimensional decorative patterns represent the Kelvin conjecture in the Medieval Era.

Keywords:

Kelvin Conjecture, Medieval Art, Geometry, Ornament, Tiling.

JEL Classification: Z00, Z00