

Two decagonal Motifs

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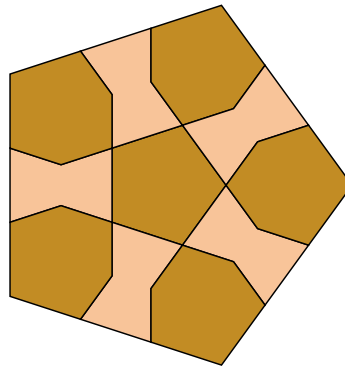
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The blue text are links to the main site. To see the detail of the interlacing, zoom in.

1 Introduction

In Islamic geometric art, small sections of a pattern are often repeated on other patterns. Such motifs are often centred by a star polygon forming a rosette, see [The Geometric Rosette : analysis of an Islamic decorative motif](#). Here we consider two motifs which appear in decagonal patterns are a centred by a pentagon. Both theses motifs have $*5 \bullet (d5)$ symmetry.

2 First motif

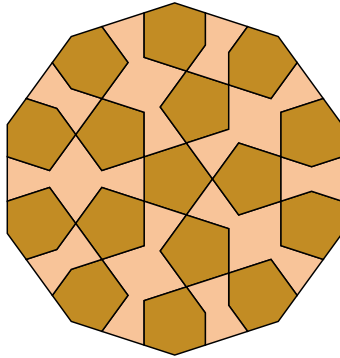


To locate all the patterns containing this motif, we first find the tile number of the two six-sided tile shapes. A few lines of SQL then list all the 54 patterns

containing these two tiles. The presence of the pentagon is ignored since this would complicate the SQL and actually only remove two patterns from consideration. The 54 patterns then need to be inspected to determine the presence of the motif. The SQL does not consider the arrangement of tiles in a pattern since this cannot be simply characterised.

The 15 patterns containing this motif are listed in motif1.

3 Second motif



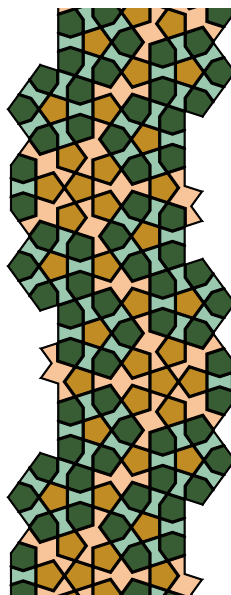
To locate all the patterns containing this motif, we first find the tile number of the two six-sided tile shapes (as in the first motif) and the ten-sided tile. A few lines of SQL then list all the 31 patterns containing these three tiles. Again, the presence of the pentagon is ignored since this would complicate the SQL and not actually only remove any patterns from consideration. The 31 patterns then need to be inspected to determine the presence of the motif.

The 3 patterns containing this motif are listed in motif2.

4 Conclusion

This study actually arose from a pattern which contains both motifs. This pattern has been produced from a photo by Miroslaw Majewski from Camlica Mosque, see [Camlica Mosque, Istanbul](#).

The web site version is shown with the window frame, which implies that the left and right edges are not a mirror line of the pattern. The conclusion is that there is a vertical repetition, but not a horizontal one. The same pattern without the window frame is:



This implies that the symmetry is that of a frieze pattern, actually $2^*\infty$ ($pmm2$). The pattern is the only frieze pattern on the web site with this symmetry. All the symmetries are listed on page 208 of [1].

There is another decagonal pattern containing the two motifs: [Rustem Pasha](#).

5 Acknowledgements

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References

- [1] Brian Wichmann and David Wade. *Islamic Design: a Mathematical Approach*. Springer. 2018. ISBN 978-3-319-699. URL.