Almost Equilateral Pentagonal Tilings of the Sphere

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Abstract

The classifcation of edge-to-edge tilings of the sphere by congruent pentagons can be divided into three cases: variable edge lengths, equilateral, and almost equilateral. The first two cases have been largely settled by Min Yan and his collaborators. The almost equilateral case (four edges of equal length, the fifth of different length) is the most difficult, and earlier techniques are insufficient. We introduced decision-making algorithms in wxMaxima and some new geometric constraints for the almost equilateral case. We obtained full classification for three distinct angles and partial results for five distinct angles. In particular, we found some interesting tilings not appearing in the earlier cases. This is joint work with Min Yan of HKUST.