Irregular and Semi-regular Tilings of the Hyperbolic Plane

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Abstract

In a very roughly way, Hyperbolic Geometry is a non-Euclidean geometry which deny the fifth Euclidean postulate, assuming that, from a point not belonging to a line, there are two lines through the point, which are parallels to the given line. One of the main property of Hyperbolic Geometry is that there exists a tiling (tessellation) of the hyperbolic plane by a regular polygon with p sides and with q other p-gons meeting in each vertex if, and only if, $(p - 2)(q - 2) > 4$.
Tilings of the hyperbolic plane using non-regular polygons or more than one type of regular polygons are more complexes. In this work we consider the following constructions:

i) tilings of the hyperbolic plane by copies of a semi-regular polygon with alternating angles. We study the behavior of the growth of the polygons, edges and vertices when the distance increase from a fixed initial polygon.
ii) semi-regular tilings of the hyperbolic plane, where two or more distinct regular polygons are used to tile the plane.

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