Elliptic Triangulations of Spheres

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The degree of a vertex x in a triangulation T of a sphere is the number of triangles 01, (52, ..., which contain x and is denoted by d = d(x). A triangulation T is said to be elliptic if it does not contain any point with degree greater than 6, that is, d(x) < 6 for every x e T. We used Euler's equation to get

3a3 + 2Œ4 + — — 2Œ8 — (m — 6)am = 12,

which reduces to

$3\alpha_3 + 2\alpha_4 + \alpha$= 12 in the elliptic case. There are

19 nonnegative solutions ((13 [14, as) for this equation.

We call ct4, as) is the type of the triangulation T. It has been shown that for each of the solution ((13 114, as) there exist a triangulation T and a non negative integer N = (.16 0 with the property

(Œ3(T), a4(T), Œ6(T) = (a3, a4, 115, (16).

Our main aim was to find, for each of the 19 types of triangulations, all possible values of N = a6 . We describe various methods to construct elliptic spherical triangulations such as the mutant, productive and self-reproductive configurations, the fullering constructions and the glueing of patches method.

We remark here that some non-existence results on triangulations have been obtained by Grunbaum, Eberhard, and Bruckner have determined the minimum values of N such that
the triangulations of type (a_3, a_4, a_5, N) exist for each of the 19 nonnegative solutions (a_3, a_4, a_5).

Key Words: Polygon, Triangulations, Patches

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