Geometry, Curvature and Combinatorics on the Torus

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Abstract

We consider euclidean metrics with cone points on the torus. Any such metric can be developed onto the euclidean plane. We prove a theorem giving a strange restriction on the holonomy in the case of just two cone points; this has several interesting combinatorial corollaries. For instance, in any triangulation of the torus, the average vertex degree is six. We show there is no triangulation with just two exceptional vertices, of degree 5 and 7.

This is joint work with Ivan Izmestiev and Guenter Rote. I will also mention a related conjecture in Riemann surface theory, now proven by Boris Springborn.