GEODESIC PLANES IN GEOMETRICALLY FINITE MANIFOLDS - CORRIGENDUM

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This erratum corrects an error in [Kh19, Propoistion 1]. The proposition (and the sentence immediately above it on pg. 5) incorrectly asserted that the complexity of an accumulating sequence of elementary planes must increase in the limit. Below is the corrected version of Proposition 1 as well as its proof which replaces the argument in Section 8. This error does not affect the main results of the article: Theorems 1.1-1.5.

Proposition 1. *Let $k \geq 3$ be an integer and let $\mathcal{B}_k$ denote the set of circles $C \subset \mathbb{S}^2$ such that $|C \cap \Lambda| = k$. Then, $\mathcal{B}_k$ is a discrete Γ-invariant set. Moreover, if a circle C with $|C \cap \Lambda| < \infty$ is an accumulation point of $\mathcal{B}_k$, then $|C \cap \Lambda| < k$.*

Proof. Suppose that there is some $k \geq 3$ and $C \in \mathcal{B}_k$ such that there exists a sequence of circles $C_n \in \mathcal{B}_k$ converging to C.

Let $B_1, \ldots, B_k$ be the components of Ω meeting C. Let η be the center of one of the disks in $\mathbb{S}^2$ bounded by C and let r be its radius. Let $\varepsilon > 0$ be small enough so that the 2 circles bounding the 2 disks centered around η and of radius $r - \varepsilon$ and $r + \varepsilon$ respectively meet B_i for all i. This is possible because we only have finitely many components B_i.

Next, let $\mathcal{N}_\varepsilon(C)$ be the ε-annulus around C; cf. [Kh19, Definition 2.2]). Then, by [Kh19, Proposition 2], we have that for all $n \gg 1$,

$$C_n \in \mathcal{N}_\varepsilon(C).$$

But, one has that any circle lying entirely inside the annulus $\mathcal{N}_\varepsilon(C)$ must meet B_i, for all i by choice of ε. Moreover, any circle lying inside $\mathcal{N}_\varepsilon(C)$ and meeting exactly k components of Ω must pass through all k tangency points of these components. Since $k \geq 3$, there is one unique such circle which is C. Then, C_n must meet strictly more than k components of Ω for all $n \gg 1$, which contradicts the fact that $C_n \in \mathcal{B}_k$ for all n. The same argument also implies the second assertion of the lemma. □

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References

[Kh19] O. Khalil. Geodesic Planes in Geometrically Finite Manifolds. *Discrete & Cont. Dyn. Syst. Series A,* 2019, 39(2), 881–903.

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