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ON UPPER BOUNDS FOR THE RATIOS OF TEICHMULLER TO STABLE TRANSLATION LENGTHS OF SOME PSEUDO-ANOSOV MAPS

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On Upper Bounds for the Ratios of Teichmuller to Stable Translation Lengths of Some Pseudo-Anosov Maps

Synopsis

In this presentation we provide a better upper bounds for the ratios of Teichmuller to stable translation lengths of point pushing pseudo-Anosov maps on punctured Riemann surfaces.

ON UPPER BOUNDS FOR THE RATIOS OF TEICHMULLER TO STABLE TRANSLATION LENGTHS OF SOME PSEUDO-ANOSOV MAPS

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Let S_0 be a closed Riemann surface of genus $p > 1$, and let $\mathcal{C}(S_0)$ be the associated curve complex with the set of vertices $\mathcal{C}_0(S_0)$. Let $d_{\mathcal{C}}(u, v)$ be the distance between u and v which is the smallest number of adjacent edges in $\mathcal{C}_1(S_0)$ joining u to v. For a pseudo-Anosov map $f : S_0 \to S_0$, we define stable (or asymptotic) translation length of f as

$$\tau_{\mathcal{C}}(f) = \liminf_{m\to\infty} \frac{d_{\mathcal{C}}\left(u, f^m(u)\right)}{m}.$$

It is well-known that $\tau_{\mathcal{C}}(f)$ does not depend on the choice of $u \in \mathcal{C}_0(S_0)$. Consider the ratio

$$r(f) = \frac{\log \lambda(f)}{\tau_{\mathcal{C}}(f)},$$

where $\lambda(f)$ is the dilatation of f. It was shown by Gadre–Hironaka–Kent–Leninger that there exists a uniform constant C with the following property: for every genus $p \geq 5$, there exists a pseudo-Anosov f on S_0 such that $r(f) < C \log(p)$.

For every genus $p > 1$, let S denote a surface of genus p which contains only one puncture. Let $\mathscr{F}$ be the (normal) subgroup of $\mathrm{Mod}(S)$ that consists of mapping classes on S isotopic to the identity as the puncture is filled in. Aougab–Taylor recently showed that there exists a uniform constant C' with a similar property as above: for every $p > 1$, there exists a pseudo-Anosov $f \in \mathscr{F}$ such that $r(f) < C' \log(3p - 3)$. The purpose of this presentation is to prove the following result.

Theorem 1. For every genus $p > 1$, there exists a pseudo-Anosov map $f \in \mathscr{F}$ on S such that the following inequality holds:

$$r(f) \leq \tfrac{5}{4} \log\left(8p^2 + 12p + 3\right).$$

As a direct consequence, we obtain

Theorem 2. The constant C' can be chosen to satisfy $C' \leq 2.5$.

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