TOPOLOGY SEMINAR

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The Surface Subgroup Theorem and the Ehrenpreis conjecture.

Tuesday, January 25th. 4:00 in 383-N

Abstract:

We prove that there is a hyperbolic surface $S$ such that for any closed hyperbolic 2 or 3-manifold $M$, and $\epsilon > 0$, there is a finite cover $\tilde{S}$ of $S$, and a map $f: \tilde{S} \to M$ that is locally within $\epsilon$ of being an isometric immersion. When $\dim M = 3$ this implies that $\pi_1(M)$ has a surface subgroup, and when $\dim M = 2$ this is the Ehrenpreis conjecture.

In either case, the surface $f(S)$ is constructed by putting together immersed pairs of pants in $M$, and in both cases we can construct a collection of good pants that are evenly distributed around every closed geodesic that appears as a boundary. If $\dim M = 3$ then we can immediately assemble these pants, with a twist, to form the desired surface $f(S)$.

In the case where $\dim M = 2$, there may be more pants on one side of a geodesic than the other. In order to determine how to correct the collection of pants, we develop the "good pants homology" of good curves modulo the boundaries of good pants, and show through a series of algebraic identities that it is equivalent to the standard homology.

This is joint work with Vladimir Markovic.