Research topics

Ryosuke Mineyama

I am studying finitely generated groups and geometric objects (equipped with a group action) using large scale information.

Coxeter groups. Hohlweg, Labbe and Ripoll introduced a way of study of infinite Coxeter groups through investigating the infinite root systems. They also set a conjecture about the distribution of the set of accumulation points of roots. I solved the conjecture in a strict case with Akihiro Higashitani and Norihiro Nakashima. Under our condition, the normalized action can be regarded as a discrete action on the hyperbolic space. Hence such Coxeter groups are Kleinian groups. I showed that the set of accumulation points of roots coincides with the limit set.

Teichmüller space. Royden's theorem states that "the group of biholomorphic automorphisms of the Teichmüller space and the mapping class group of the base space are isomorphic". I gave an alternative proof of this theorem with Hideki Miyachi. Royden and other authors proved via the infinitesimal structure of the Teichmüller space. In contrast, we proved via the boundary at infinity of the Teichmüller space.

Hilbert geometry. For any bounded convex domain in the Euclidean space, we can define another proper metric so called the Hilbert metic. A domain equipped with the metric is called a Hilbert geometry. Shin-ichi Oguni and I started a study of Hilbert geometries from the coarse geometric point of view. We showed that any Hilbert geometry is "good" in the sense of coarse geometry. In addition, we showed that strict convexity of a domain is a necessary and sufficient condition for the natural boundary of the domain to be a "nice" boundary (corona). As a consequence, we see that the coarse Novikov conjecture holds for any Hilbert geometry with a good boundary.

Outer automorphisms of free groups. In a joint work with Hidetoshi Masai, I define fibered commensurability of outer automorphisms of free groups. Fibered commensurability is originally introduced by Calegari, Sun and Wang for mapping class groups on surfaces. By rephrasing the definition in terms of the action on the fundamental groups, we can define fibered commensurability of outer automorphisms of free groups. In the case of mapping classes of surfaces, the Nielsen-Thurston class is a commensurability invariant. We show that for non-geometric elements, fully irreduciblity is a commensurability invariant for automorphisms of free groups. In addition, each commensurability class of a pseudo-Anosov mapping classes contains a unique minimal element for a natural partial prder. Corresponding to this, under some geometric conditions, we show that commensurability class contains a unique minimal element.