Abstract

Complexes of groups describe the actions of groups on simply connected poly hedral complexes. These are a natural generalization of the concept of graphs of groups introducd by Bass and Serre. In this thesis, we address some questions associated to the complexes of groups. We first show that the palindromic width of HNN extension of a group by proper associated subgroups and the palindromic width of the amalgamated free product of two groups via a proper subgroup is infinite (except when the amalgamated subgroup has index two in each of the factors). As a corollary of these, the palindromic width of the fundamental group of a graph of groups is mostly infinite. Next, we prove a limit intersection theorem for a relatively hyperbolic group G that admits a decomposition into a finite graph of relatively hyperbolic groups structure with quasi-isometrically (qi) embedded condition. We prove that the set of conjugates of all the vertex and edge groups satisfy the limit set intersection property for conical limit points. Finally, we study the existence of Cannon-Thurston maps for certain subfamily complex of hyperbolic groups. Let G be the fundamental group of a complex of hyperbolic groups G(Y) with respect to a maximal subtree T of Y. Suppose G(Y) is developable and the monomorphisms $Ge \to Gi(e)$ and $Ge \to Gt(e)$ have finite index images in the target groups. Let Z be a connected subcomplex of Y and H be its fundamental group with respect to a maximal subtree $T1 \subset T$ of Z. If the natural homomorphism $i : H \to G$ is injective and the natural map from the development of G(Z) to that of G(Y) is a qi-embedding, then H is also hyperbolic and i admits a Cannon-Thurston map $\partial i : \partial H \to \partial G$.