Abstract

Braids have always fascinated man with its twisting and curling. Braids although have origin dated with the history of mankind itself. The mathematical study of Braids first appeared in work of Hurwitz in hidden from but Emil Artin was the first, who explicitly defined Braids as groups with presentation in form of generators and relations. Braids since than became subject of interest for both mathematicians and physicists. Physicists study them from point of view of Quantum theory and explain different quantum phenomenon using Braids. Mathematicians study them by their group structures formed by taking fundamental group of configurations of a space. Braids are also studied as group of n strings. The way of making this group of n strings is to fix all but a crossing between any two. Braids are shown to be linear by using representations. Here in my present investigation of these objects, in my thesis, I will explain some basics of the subject algebraic topology, whose low dimensional part consists of these objects along with knots and links. Braids are also considered as group of mapping classes of a particular space. It has became a widely studied topic in understanding braids. These mapping classes has their homological representations and these representation are taken as the representations of braid groups. I have discussed here, the famous of these representations, i.e. of Burau's and Lawerence-Krammar-Bigelow's. These representations are considered as action of mapping classes on braids. Although the original Burau representation was not homological but its homological version is also explained here. The Lawerence-Krammar-Bigelow's representation is the generalized form of Lawrence representation, that was over some specific field. But this LKB is considered on a general homology module of a space. One noticeable thing in these representations is, these are developed using homology modules over commutative local systems. We study the action of group of the mapping-classes

$M(\Sigma)$ and restricts to an untwisted representation on the Chillingworth subgroup $Chill(\Sigma) \subseteq M(\Sigma)$. Moreover, it may be untwisted on the Torelli group $T(\Sigma)$ by passing to a Z-central extension, and, in the special case where we take coefficients in the Schr¨odinger representation of H, it may be untwisted on the full group of the mapping classes $M(\Sigma)$ by passing to stable universal extension. We illustrate our construction with several calculations for 2-point configurations, in particular for genus-1 separating twists.
We also obtain a presentation for this newly defined group and a quotient homomorphism to an Heisenberg group with infinite cyclic center. We then define homologies of weakly framed configurations with coefficients in any representation of the Heisenberg group. Finally we construct a twisted action of what we call the f− based group of the mapping classes, an extension done centrally, of the group of the mapping classes of the impaled-surface whose elements are represented by diffeomorphisms fixing the weakly framed set of punctures.