Braids and homotopy groups of spheres

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Abstract

We start with the geometrical (naive) definition of braids and then identify them with the fundamental group of configuration space of a manifold. The case of a surface is particular interesting. We recall some classical properties of braids and then pass to Brunnian braids. A braid is Brunnian if it becomes trivial after removing any one of its strands. We describe algebraically the group of Brunnian braids on a general surface, if the surface is not a sphere or projective plane. In these exceptional cases the group of Brunnian braids is described by an algebraic procedure together with the homotopy groups of a 2-sphere. If there will be time we shall speak about the graded Lie algebra of the descending central series related to Brunnian braid group. It is proved that this is a free Lie algebra and the set of free generators is described.