

Converting side-pairings to handle-decompositions

Dubravko Ivanšić
Murray State University

Abstract. Many geometric manifolds are constructed through side-pairings of polyhedra. We describe a way to convert the side-pairing into a handle-decomposition of the manifold and offer two applications.

The author has previously shown that the orientable double cover of one of Ratcliffe and Tschantz's noncompact hyperbolic 4-manifolds is a complement of 5 tori in a topological 4-sphere N . We use the above conversion method to show that N is diffeomorphic to the standard 4-sphere.

There are many examples of noncompact hyperbolic 3-manifolds given by side-pairings of polyhedra which turn out to be link complements in the 3-sphere. Justifying that a side-pairing gives a particular link complement is often involved and typically requires knowing in advance what the link is going to be. Our conversion method gives a simple way of turning a side-pairing into a link complement and produces the link diagram along the way.