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by

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MOTION PLANNING IN CONNECTED SUMS OF REAL PROJECTIVE SPACES

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Abstract. The topological complexity $\mathsf{TC}(X)$ is a homotopy invariant of a topological space X, motivated by robotics, and providing a measure of the navigational complexity of X. The topological complexity of a connected sum of real projective planes, that is, a high genus nonorientable surface, is known to be maximal. We use algebraic tools to show that the analogous result holds for connected sums of higher dimensional real projective spaces.

1. Introduction

Let X be a finite, path-connected CW-complex. Viewing X as the space of configurations of a mechanical system, the motion planning problem consists of constructing an algorithm which takes as input pairs of configurations $(x_0, x_1) \in X \times X$, and produces a continuous path $\gamma\colon [0,1] \to X$ from the initial configuration $x_0 = \gamma(0)$ to the terminal configuration $x_1 = \gamma(1)$. The motion planning problem is of significant interest in robotics; see, for example, Jean-Claude Latombe [15] and Micha Sharir [17].

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