

Pulling apart orthogonal groups to find continuous braids

Jon McCammond

jon.mccammond@math.ucsb.edu; mccammond@math.ucsb.edu

Department of Mathematics

UC Santa Barbara

Santa Barbara, CA 93106

USA

Abstract

Suppose you were asked to complete the following analogy—symmetric groups are to braids groups as the orthogonal groups $O(n)$ are to (blank). In this talk I'll present one possible answer to this question. Other answers are possible since it depends on how one envisions the braid groups being constructed out of symmetric groups, but most of the standard constructions do not extend to continuous groups such as $O(n)$.

The groups I'll discuss are slightly odd in that they have a continuum of generators, a continuum of relators but nevertheless have a decidable word problem (in a suitable sense), a finite dimensional Eilenberg–MacLane space (that is not locally finite) and many other nice properties. In particular, if we view Sym_n as the subgroup of $O(n)$ that permutes the coordinate axes, then Braid_n naturally embeds as a subgroup of the pulled apart version of $O(n)$.