

Compact connected Lie group actions on acyclic manifolds

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We focus on the question which manifolds M are diffeomorphic to the fixed point sets of smooth compact connected Lie group actions on acyclic manifolds, in particular, disks and Euclidean spaces.

First, we recall the answer to the question in the case where the acting group G is abelian (i.e., G is a torus) and then, we discuss the non-abelian case of G . For abelian G , M must be acyclic by the Smith Theory, while in the case of non-abelian G , it turns out that M must be stably parallelizable. Assuming that M is both stably parallelizable and compact (resp., open), we prove that there exists a smooth action of G on a disk (resp., Euclidean space) such that the fixed point set is diffeomorphic to M .