Smooth Actions of Finite Perfect Groups on Complex Projective Spaces

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Abstract

I will present a construction of smooth actions of most of finite perfect groups on complex projective spaces. The construction is carried via equivariant surgery but requires substatial input from the theory of group actions on disks and the theory of Burnside rings. In the talk I will try to explain the story behind the theorem below as well as introduce (shortly) the equivariant surgery theory itself.

Let G be a finite perfect group with an element not of prime power order. I will show that

Theorem. *If a manifold F can be realised as the fixed point set of a smooth action of G on a disk, then F can be realised as the fixed point set of a smooth action of G on some manifold $\mathbb{C}P^n$.*

Since a complete description of the fixed point sets of such actions on disks has been obtained by K. Pawałowski and R. Oliver (see eg. [2]), this theorem may be used to describe possible fixed point sets of perfect group actions on complex projective spaces up to diffeomorphism type. A similar result is available for $G = A_5$, however we are able to prove it using technical assumptions on the dimensions of the fixed point sets, and the proof is much more involved.

This talk is based on the results of my PhD Thesis [1]

Bibliography

[1] M. Kaluba, Constructions of smooth exotic actions on homotopy complex projective spaces and products of manifolds, PhD Thesis, UAM Poznań, March 2014.

[2] B. Oliver, Fixed point sets and tangent bundles of actions on disks and Euclidean spaces, *Topology* **35**, Issue 3 (1996), pp. 583–615.