

First Joint Meeting Brazil Italy of Mathematics

Special Session: Geometric Topology and Dynamics

Rio de Janeiro, August 29 - September 02, 2016

Title: On finite group actions on surfaces, finite graphs and 3-manifolds

Authors: Bruno P. Zimmermann (speaker), Chao Wang, Shicheng Wang, Yimu Zhang

Abstract: We report on two recent results on finite group actions of large order on surfaces and finite graphs embedded in S^3 , and on closed 3-manifolds:

i) By a classical result of Hurwitz, the maximal possible order of a finite orientation-preserving group action on a closed orientable surface F_g of genus $g > 1$ is $84(g - 1)$. In a program to visualize finite group actions of large orders on surfaces, in joint work with Chao Wang, Shicheng Wang and Yimu Zhang, we consider finite group actions on pairs (S^3, F_g) where F_g is a closed surface of genus g embedded in S^3 . An upper bound for the order is $12(g - 1)$ now, and we determine the maximal order of such an action for each $g > 1$; in fact, we classify all finite group actions on such pairs (S^3, F_g) of orders larger than $4(g - 1)$. Then we give a similar classification for finite group actions on finite graphs of rank $g > 1$ embedded in S^3 .

ii) If there remains time, we will discuss also joint work with M. Boileau, C. Franchi, M. Mecchia and L. Paoluzzi where we show that, given a closed 3-manifold M , there is a universal bound on the number of inequivalent knots in S^3 which have M as a cyclic branched covering. The most interesting and difficult case here is that of a hyperbolic 3-manifold M (in particular, with a finite group of isometries) where one has to rely heavily on methods from finite group theory, including the classification of the finite simple groups.