Wasatch Topology Conference Abstracts

Daniel Biss
University of Chicago
daniel@math.uchicago.edu

Decomposing $Out(F_n)$

Abstract

Outer automorphism groups of free groups provide interesting analogues of mapping class groups and arithmetic groups. I'll discuss homological decompositions of Out(F_n) that take their roots in the mapping class group side of the subject, but have explicit group-theoretic implications that are more reminscent of the arithmetic side.

Kai-Uwe Bux
Cornell University
bux@math.cornell.edu

Thompson's Group F is Maximal Non-Convex

Abstract

(Joint work with J. Belk. Preprint at arxiv: math.GR/0301141)

Let G be a group with finite generating set S, and let B(n) denote the ball of radius n centered at 1 in the Cayley graph. There are two natural metrics on B(n):

- the restricted word metric, denoted by w(-,-) - the metric of shortest paths that are not allowed to leave B(n), denoted by p(-,-).

J. Cannon defined G to be almost convex (with respect to S) if these two metrics do not differ too much, i.e, there is a global constant C such that for any two points x and y in B(n) with w(x,y)¡=2, we have p(x,y) ¡= C.

S. Cleary and J. Taback proved that R. Thompson's group F is not almost convex with respect to the standard two element generating set. We improve upon their result and show that it is as far from being convex as possible: For arbitrary large n, there are pairs x, y in B(n) such that:

w(x,y) = 2 and p(x,y) = 2n

(Note that for any two points a, b in B(n), p(a,b) ¡= 2n as they can always be connected by a path passing through 1.)

In this talk, I will explain how elements of F can be represented pictorially by tree diagrams and forest diagrams. Outlining the proof of the result above, I shall argue that forest diagrams are a better tool than tree diagrams for understanding the length in F with respect to the standard generating set.

Daryl Cooper
University of California, Santa Barbara
cooper@math.ucsb.edu

A combination theorem for Kleinian groups
with applications to surface groups in 3 manifolds

Abstract

Suppose A and B are two quasi-Fuchsian subgroups of a torsion free cocompact Kleinian group and they intersect in a group C. Then there are subgroups of finite index A' and B' which contain C so that the subgroup generated by A' and B' is their free product amalgamated along C. We will discuss an extension to the cusped case and applications to surface subgroups. This is joint work with Mark Baker.

Steve Ferry
Rutgers University
stevef@math.uchicago.edu

Epsilon-delta surgery over Z

Joseph Maher
Caltech
maher@its.caltech.edu

Period three actions on the 3-sphere

Abstract

We show that a free period three action on the 3-sphere is standard, i.e. the quotient manifold is homeomorphic to a Lens space. Given a sweepout of the 3-sphere by 2-spheres, we get three families of surfaces from the group action, and we analyze their intersections to produce an invariant unknotted curve, which shows the action is standard. This is joint work with Hyam Rubinstein.

Jason Manning
University of California, Santa Barbara
manning@math.ucsb.edu

Pseudocharacters on groups and quasi-actions on trees

Abstract

A pseudocharacter is a real valued function on a group which is coarsely a homomorphism. Many important families of groups tend to have large numbers of pseudocharacters. We show how a nontrivial pseudocharacter gives rise to a quasi-action on a tree. This tree reflects the geometry of the coarse level sets of the pseudocharacter, and the construction thus gives rise to examples of exotic quasi-actions on infinite valence bushy trees.

Jon McCammond
University of California, Santa Barbara
jon.mccammond@math.ucsb.edu

The poset of hypertrees and the ℓ^2-betti numbers of $P\Sigma_n$

Abstract

The pure symmetric automorphism group, $P\Sigma_n$, is a subgroup of $Aut(F_n)$ which can also be described as the motion group of the n unknotted, unlinked circles in the 3-sphere.

In an earlier article Noel Brady, John Meier, Andy Miller and I proved that this group is a virtual duality group. The proof used a spectral sequence approach that ultimately depended on understanding something about the combinatorics of a certain poset of hypertrees. More recently, John Meier and I have returned to this group to compute its ℓ^2-Betti numbers, and the calculations, once again, ultimately boil down to interesting combinatorics of the hypertree poset. Although the cohomology computations will be briefly outlined, the primary focus of the talk will be on the combinatorial structure of the hypertree itself.

John Meier
Lafayette College
meierj@lafayette.edu

Cannon Pairs

Abstract

The pair (G, S) consisting of a group G and a finite generating set S is called a *Cannon pair* if the language of all geodesics with respect to S forms a regular language. I will discuss two results on Cannon pairs. The first is that Cannon pairs are preserved under graph products (from an REU project with Joe Loeffler and James Worthington). The second is recent work with Ruth Charney on Garside groups. Garside groups are groups admitting a lattice generating set and they share many structural properties with braid groups. We show that Garside groups with their lattice generating sets also form Cannon pairs.

Tim Riley
Yale
tim.riley@yale.edu

Planar graphs, duality and filling functions for groups

Kevin Whyte
University of Illinois at Chicago
kwhyte@math.uic.edu

The theory of coarse fibrations

Abstract

Several recent studies of the quasi-isometric geometry of groups have involved, implicitly or explicitly, various types of large scale analogues of bundle structures. We will discuss some issues that arise in the general theory of such objects, and present some structural results. These have applications to the geometry of groups, including many graphs of groups, semi-direct products, central extensions, and mapping class groups.