the 9th KAIST Geometric Topology Fair

Lecture Series.

The talks can be watched at MathNet Korea (for Mac, right-click the links to the videos, download, and open with VLC media player).

Random rigidity in free groups
by Danny Calegari (Caltech)

The theme of these lectures is to describe some recent joint work with Alden Walker concerning the geometry of the unit ball in the scl norm in free groups. There are two main results: firstly, a random homomorphism between free groups induces an isometry in the scl norm. Secondly, the unit ball in a random subspace is C^0 close to a (scaled) octahedron. The proof of these facts use techniques from topology, small cancellation theory, and ergodic theory. Some generalizations to hyperbolic groups and spaces will be discussed if time allows.

Recognizing low-dimensional manifold groups
by Jason F. Manning (State University of New York at Buffalo)

For any n, and a class of finite presentations C, one can ask the questions:
(1) Are fundamental groups of closed n-manifolds algorithmically distinguishable in the class C?
(2) Are fundamental groups of closed aspherical n-manifolds algorithmically distinguishable in the class C?
I'll give examples of n and C for which the answers to these questions are positive. This is joint work with Daniel Groves and Henry Wilton.

Embedding finitely generated groups into finitely presented groups
by Mark V. Sapir (Vanderbilt)

I will talk about various versions of the celebrated Higman embedding theorem: every recursively presented group embeds into a
finitely presented group. In particular, I will show how one can characterize groups with word problem in NP, and describe Higman
embedding preserving asphericity, which leads to a construction of
aspherical manifolds with infinite asymptotic dimension and other
extreme properties.

Asymptotic group theory - pro-p groups; property T and expansion
by Efim Zelmanov (Univeristy of California at San Diego)

Talks.

Simplicial volume and bounded group cohomology
by *Sungwoon Kim (KIAS)*

Simplicial volume is a homotopy invariant of oriented manifolds introduced by Gromov. On the other hand, the simplicial volume can be described in terms of bounded group cohomology. I will give important properties and applications of the simplicial volume. In particular, I will talk about the simplicial volume of locally symmetric spaces of non-compact type with arithmetic fundamental group.

Embeddability between right-angled Artin groups
by Sang-hyun Sam Kim (KAIST)

We study the existence of embeddings between two right-angled Artin groups. When such right-angled Artin groups are two-dimensional, we have a complete combinatorial characterization. Another notable case to be resolved is when the defining graph

of at least one right-angled Artin group is a forest. Finally, we give a concrete description of which right-angled Artin groups on cycles are embedded into each other. The key idea is to embed right-angled Artin groups into mapping class groups of closed surfaces and use the properties of pseudo-Anosov homeomorphisms on subsurfaces.

Graph braid groups: its 10 year history
by Kihyoung Ko (KAIST)

The configuration space of n points on a graph was introduced about 10 years ago by Ghrist and Abrams to apply topology to robotics. Its homology groups and a presentation of its fundamental group, also called graph braid group, can be theoretically computed via various methods. It is more interesting to understand characteristics of them. For example, many graph braid groups are right-angled Artin group and the homology groups of a planar graph braid group are torsion-free. We will walk through its short history in this talk.

Combinatorial group theory applied to 2-bridge link groups
by Donghi Lee (Pusan National University)

I will talk about a complete characterization for two essential simple loops on a 2-bridge sphere of a 2-bridge link to be homotopically equivalent in the link complement. The main

technique to obtain this result is small cancellation theory applied to 2-bridge link groups. As an application of this result, a variation of McShane's identity for 2-bridge links will be also discussed. This is joint work with Makoto Sakuma.

Commensurizer group and its growth
by *Seonhee Lim (Seoul National University)*

We will introduce a new asymptotic invariant of a pair consisting of a group and a subgroup, which we call Commensurizer Growth. We compute the commensurizer growth for various locally compact topological groups and lattices inside it. Two main examples will be lattices in Lie groups and those in automorphism groups of trees. This is a joint work with Nir Avni and Eran Nevo.