

Teoría Geométrica de grupos (Temario)

Generating groups

- 1.1 Review of the category of groups
 - 1.1.1 Abstract groups: axioms
 - 1.1.2 Concrete groups: automorphism groups
 - 1.1.3 Normal subgroups and quotients
- 1.2 Groups via generators and relations
 - 1.2.1 Generating sets of groups
 - 1.2.2 Free groups
 - 1.2.3 Generators and relations
 - 1.2.4 Finitely presented groups
- 1.3 New groups out of old
 - 1.3.1 Products and extensions
 - 1.3.2 Free products and amalgamated free products

2 Cayley graphs

- 2.1 Review of graph notation. Cayley graphs
- 2.3 Cayley graphs of free groups. Free groups and reduced words
 - 2.3.2 Free groups $\rightarrow$ trees
 - 2.3.3 Trees $\rightarrow$ free groups

3 Group actions

- 3.1 Review of group actions
 - 3.1.1 Free actions
 - 3.1.2 Orbits and stabilisers
 - 3.1.3 Transitive actions
- 3.2 Free groups and actions on trees. Spanning trees for group actions. Reconstructing a Cayley tree . Application: Subgroups of free groups are free
- 3.3 The ping-pong lemma
- 3.4 Free subgroups of matrix groups
 - 3.4.1 Application: The group $SL(2, \mathbb{Z})$ is virtually free
 - 3.4.2 Application: Regular graphs of large girth
 - 3.4.3 Application: The Tits alternative

4 Quasi-isometry

- 4.1 Quasi-isometry types of metric spaces
- 4.2 Quasi-isometry types of groups
 - 4.2.1 First examples
- 4.3 Quasi-geodesics and quasi-geodesic spaces
 - 4.3.1 (Quasi-)Geodesic spaces
 - 4.3.2 Geodesification via geometric realisation of graphs
- 4.4 The Svarc–Milnor lemma
 - 4.4.1 Application: (Weak) commensurability
 - 4.4.2 Application: Geometric structures on manifolds
- 4.5 The dynamic criterion for quasi-isometry
 - 4.5.1 Application: Comparing uniform lattices

- 4.6 Quasi-isometry invariants
 - 4.6.1 Quasi-isometry invariants
 - 4.6.2 Geometric properties of groups and rigidity
 - 4.6.3 Functorial quasi-isometry invariants
- 5 Growth types of groups
 - 5.1 Growth functions of finitely generated groups
 - 5.2 Growth types of groups
 - 5.2.1 Growth types
 - 5.2.2 Growth types and quasi-isometry
 - 5.2.3 Application: Volume growth of manifolds
 - 5.3 Groups of polynomial growth
 - 5.3.1 Nilpotent groups
 - 5.3.2 Growth of nilpotent groups
 - 5.3.3 Polynomial growth implies virtual nilpotence
 - 5.3.4 Application: Virtual nilpotence is geometric 143
 - 5.3.5 More on polynomial growth
 - 5.3.6 Quasi-isometry rigidity of free Abelian groups
 - 5.3.7 Application: Expanding maps of manifolds
 - 5.4 Groups of uniform exponential growth
 - 5.4.1 Uniform exponential growth

Hyperbolic groups

- 6.1 Classical curvature, intuitively
- 6.2 (Quasi-)Hyperbolic spaces
 - 6.2.1 Hyperbolic spaces
 - 6.2.2 Quasi-hyperbolic spaces
 - 6.2.3 Quasi-geodesics in hyperbolic spaces
 - 6.2.4 Hyperbolic graphs
- 6.3 Hyperbolic groups
- 6.4 The word problem in hyperbolic groups
 - 6.4.1 Application: “Solving” the word problem
- 6.5 Elements of infinite order in hyperbolic groups
 - 6.5.1 Existence
 - 6.5.2 Centralisers
 - 6.5.3 Quasi-convexity
 - 6.5.4 Application: Products and negative curvature

Bibliografía

CURSO TEORÍA GEOMÉTRICA DE GRUPOS

1) Clara Löh.

Geometric Group Theory: An Introduction

Universitext

SPRINGER VERLAG

2) Cornelia Drutu, Michael Kapovich.
Geometric Group Theory
American Mathematical Society
Colloquium Publications, Volume 63