This is a collection of surveys and primarily expository articles focusing on recent developments concerning various quantitative aspects of “thin groups.” There are discrete subgroups of semisimple Lie groups that are both big (Zariski dense) and small (of infinite covolume). This dual nature leads to many intricate questions. Over the past few years, many new ideas and techniques, arising in particular from arithmetic combinatorics, have been involved in the study of such groups, leading, for instance, to far-reaching generalizations of the strong approximation theorem in which congruence quotients are shown to exhibit a spectral gap, referred to as superstrong approximation. This book provides a broad panorama of a very active field of mathematics at the boundary between geometry, dynamical systems, number theory, and combinatorics. It arose from the MSRI Hot Topics workshop of the same name in February 2012.
Mathematical Sciences Research Institute
Publications

61

Thin Groups and Superstrong Approximation
1 Freed/Uhlenbeck: *Instantons and Four-Manifolds*, second edition
2 Chern (ed.): *Seminar on Nonlinear Partial Differential Equations*
3 Lepowsky/Mandelstam/Singer (eds.): *Vertex Operators in Mathematics and Physics*
4 Kac (ed.): *Infinite Dimensional Groups with Applications*
5 Blackadar: *K-Theory for Operator Algebras*, second edition
6 Moore (ed.): *Group Representations, Ergodic Theory, Operator Algebras, and Mathematical Physics*
7 Chorin/Majda (eds.): *Wave Motion: Theory, Modelling, and Computation*
8 Gersten (ed.): *Essays in Group Theory*
9 Moore/Schochet: *Global Analysis on Foliated Spaces*, second edition
10–11 Drasin/Earle/Gehring/Kra/Marden (eds.): *Holomorphic Functions and Moduli*
12–13 Ni/Peletier/Serrin (eds.): *Nonlinear Diffusion Equations and Their Equilibrium States*
14 Goodman/de la Harpe/Jones: *Coxeter Graphs and Towers of Algebras*
15 Hochster/Huneke/Sally (eds.): *Commutative Algebra*
16 Gross/Hunke/Jain: *Galois Groups over Q*
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