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Topological Methods in Group Theory

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Preface

The field of geometric group theory is built around one overarching philosophy – to understand a group G by understanding a space X on which it acts. This prompts a rich back and forth, between properties of the group, and properties of the space. Since a given group can act on many different spaces, a major theme is to try and find the “best” space on which G acts. This naturally leads to a strong interplay between geometric group theory and topology.

One of the early proponents of this method was Ross Geoghegan. In a famous 1984 paper with Ken Brown, Geoghegan showed that Thompson’s group F provided an example of a finitely presented, torsion-free, FP_∞ group that has infinite cohomological dimension. After working in other topological areas, Geoghegan returned to this topic in the mid-1990s. Around this time, he started a productive collaboration with Robert Bieri, in which they explored the controlled connectivity properties of horoballs in non-positively curved spaces – a project which is still ongoing. In 2008, Geoghegan wrote an important textbook with the same title as these proceedings. It provided an introduction to the use of topological techniques in the study of infinite groups.

In June 2014, the mathematics department at Ohio State hosted the conference “Topological Methods in Group Theory”, in honor of Ross Geoghegan’s 70th birthday. The week-long conference featured 19 plenary talks, and 22 short talks, on a variety of topics in geometric group theory. The present volume contains the proceedings of the conference. The articles in this volume cover a wide cross-section of topics in geometric group theory, including left-orderable groups, groups defined by automata, connectivity properties and Σ -invariants of groups, amenabil-

ity and non-amenability problems, and boundaries of certain groups. It also covers topics which are more geometric or topological in nature, such as the geometry of simplices, decomposition complexity of certain groups, and problems in shape theory. We hope that, through this volume, the reader will obtain a taste of the rich mathematics presented at the conference.

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We, as part of the organizing committee, thoroughly enjoyed working on this event. We would like to take this opportunity to thank all the people who helped make the conference, and these proceedings, possible. Specifically, we would like to thank the speakers and participants for a very enjoyable conference. We would also like to thank the contributors, as well as the anonymous referees, for all their hard work on the present volume.

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