TWO-GENERATOR DISCRETE SUBGROUPS OF PSL (2, R) pdf

1: SL2(R) - Wikipedia

Two-generator Discrete Subgroups of PSL (2, R) Volume of American Mathematical Society: Memoirs of the American Mathematical Society Issue of Memoirs of the AMS Series.

Our goal is to give a new and self-contained proof of the classification of 2-generator Fuchsian groups. This problem has been discussed in part by Knapp [1] and then extensively by Purzitsky []. We show that deciding discreteness in Cases reduces immediately to previous cases via a short algorithm. Thus Cases are strongly unified. Our technique is to adjoin to G a particular reflection of H 2, related to the Lie product of A and B, which gives strong geometric information about G and a nearly canonical fundamental domain when G is discrete. Case 7, on the other hand, is qualitatively different and requires a long algorithm. Received October 15, and in revised form December 17, J. In conclusion, we give a new proof of the existence of uniform collars with sharp constants used in [4]. I would like to thank Prof. Keen for sharing her expertise with me during the inception of this work; Prof. Maskit for valuable criticisms of the manuscript. The unit disc will be our standard model of H 2. An elliptic, parabolic, or hyperbolic isometry of H 2 is respectively a rotation, limit rotation, or translation. In Cases we make the following normalizations: A and B either fix a point of the real axis or have axis of translation perpendicular to the real axis, A being to the left of the imaginary axis and B to the right - - these adjustments can be accomplished by changing coordinates. Case 1 Knapp [1]: Case 7 Purzitsky [9[: We may take Acdb to be obtuse. Acdb then terminates on step 1 or 2. If i holds for Acdb, then e;. Similarly, if iii holds for Acdb, then 4. So there is a unique 3 step triangle. The converse also holds - - let Rc be a further reflection implied by a third vertex c of T. Say that the axis of Rc meets ab at d. Since the cusped triangle Acdb has finite area, it must be tiled by finitely many copies of the fundamental domain, but Acdb is not compact - - contradiction. Let R be the reflection with axis passing through a, the fixed point of A, and perpendicular to the axis of B. For clarity, we carry this out. Let T be the convex set bounded by the axes of Ro.. Note that if A and B share a fixed point, then G is not discrete. Otherwise, proceed as in Case 4, using Case 2 to finish the argument. Again, if A and B share just one fixed point G is not discrete. Otherwise, Jet R be the reflection in the common perpendicular to the axes of A and B and proceed as in Case 4 using Case 4 a second time to finish the argument. Consider A, B hyperbolic with axes intersecting in exactly one point p. Let E be elliptic of order 2 fixing p. E was introduced by Purzitsky in [9]. AEh is a square root of the commutator. It is easy to construct AEb: To deal with this situation, we use the area fo rmula for Fuchsian groups, see [2], p. Purzitsky has shown that any set of three J. Another test for discreteness is to determine when E, Ea, and Eb, up to a conjugation, occur in a 2, 3, n or a 2, 4, n triangle group - - this can clearly be accomplished in a finite number of steps. Collars Let F be a Fuchsian group. A collar about a simple axis is a neighborhood which we take to be of constant width which is also precisely invariant under the stabilizer of the simple axis. We ask the following question: This can be resolved using our present methods. Consider A, E, R where R is the reflection with axis passing t. The converse also holds: One readily sees that the axis of A is not simple with respect to A, E. We conclude that E,, is closest satisfying the conditions exactly when AEo is elliptic of order 3, and the distance from the axis of A to the fixed point of Eo is the width of the best possible uniform collar. Similar but easier reasoning can be carried out when A is parabolic or elliptic. Knapp, Doubly generated Fuchsian groups, Mich. Matelski, A compactness theorem for Fuchsian groups of the second kind, Duke Math. Purzitsky, Two generator discrete free products, Math. Purzitsky, Real two-dimensional representations of two-generator free groups, Math. Rosenberger, Two generator Fuchsian groups of genus one, Math.

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The Gilman-Maskit algorithm presented in [5] and [2] determines whether or not a non-elementary two-generator subgroup of PSL(2, R) is discrete, that is, it is an algorithm to determine whether.

Properties[edit] Since topological groups are homogeneous , one need only look at a single point to determine if the topological group is discrete. In particular, a topological group is discrete if and only if the singleton containing the identity is an open set. A discrete group is the same thing as a zero-dimensional Lie group uncountable discrete groups are not second-countable so authors who require Lie groups to satisfy this axiom do not regard these groups as Lie groups. The identity component of a discrete group is just the trivial subgroup while the group of components is isomorphic to the group itself. Since the only Hausdorff topology on a finite set is the discrete one, a finite Hausdorff topological group must necessarily be discrete. It follows that every finite subgroup of a Hausdorff group is discrete. Discrete normal subgroups play an important role in the theory of covering groups and locally isomorphic groups. A discrete normal subgroup of a connected group G necessarily lies in the center of G and is therefore abelian. Examples[edit] Frieze groups and wallpaper groups are discrete subgroups of the isometry group of the Euclidean plane. Wallpaper groups are cocompact, but Frieze groups are not. A crystallographic group usually means a cocompact, discrete subgroup of the isometries of some Euclidean space. Sometimes, however, a crystallographic group can be a cocompact discrete subgroup of a nilpotent or solvable Lie group. Fuchsian groups are, by definition, discrete subgroups of the isometry group of the hyperbolic plane. A Fuchsian group that preserves orientation and acts on the upper half-plane model of the hyperbolic plane is a discrete subgroup of the Lie group PSL 2,R , the group of orientation preserving isometries of the upper half-plane model of the hyperbolic plane. A Fuchsian group is sometimes considered as a special case of a Kleinian group , by embedding the hyperbolic plane isometrically into three-dimensional hyperbolic space and extending the group action on the plane to the whole space. The modular group is a lattice in PSL 2,R , but it is not cocompact. Kleinian groups are, by definition, discrete subgroups of the isometry group of hyperbolic 3-space. These include quasi-Fuchsian groups. A Kleinian group that preserves orientation and acts on the upper half space model of hyperbolic 3-space is a discrete subgroup of the Lie group PSL 2,C , the group of orientation preserving isometries of the upper half-space model of hyperbolic 3-space. A lattice in a Lie group is a discrete subgroup such that the Haar measure of the quotient space is finite.

3: Two-generator Discrete Subgroups of PSL (2, R) - Jane Gilman - Google Books

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4: hyperbolic geometry - Matrices generating non-discrete subgroups of SL(2,R) - MathOverflow

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5: CiteSeerX â€” Citation Query Two-generator discrete subgroups of PSL(2

ISRAEL JOURNAL OF MATHEMATICS, Vol. 42, No. 4, THE CLASSIFICATION OF DISCRETE 2-GENERATOR SUBGROUPS OF PSL(2, R) BY J. PETER MATELSKI' ABSTRACSI This paper gives a short geometric algorithm for deciding the discreteness of most 2-generator subgroups of PSL(2, R), as well as a self-contained algorithmic approach to the complete classification.

6: Jane Piore Gilman - Wikipedia

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7: Discrete group - Wikipedia

Table of Contents. Chapters. I. Introduction 1. Introduction 2. The triangle algorithm and the acute triangle theorem 3. The discreteness theorem.

8: AMS eBooks: Memoirs of the American Mathematical Society

Two-generator g oups are important because, by a result of Jorgensen, an arbitrary subgroup of PSL(2, C) is discrete if and only if every non-elementary two-generator subgroup is [8]. One solution to the two-generator real discreteness problem (i.e., A and B in PSL(2, R)) is a geometrically motivated algorithm which was begun in [7] and completed in [6], where the algorithm is given in three forms.

9: CiteSeerX â€" Citation Query Two-generator discrete subgroups of PSL(2; R). Memoirs A.M.S

The discreteness problem is the problem of determining whether or not a two-generator subgroup of \(PSL(2, R)\) is discrete. Historically, papers on this old and subtle problem have been known for their errors and omissions.

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