Visualising Hyperbolic Plane

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Abstract. Common visualisation techniques for hyperbolic plane usually are limited to standard models like Poincare disk model. This significantly limits the part of the hyperbolic plane that can be displayed at a workable scale, which diminishes usefulness. We propose a new way to visualise the hyperbolic plane that allows more of the plane to be displayed in a useful manner.

1 Introduction

2 Preliminaries

2.1 Hyperbolic Geometry

2.2 Models of Hyperbolic Plane

2.3 Motions of the Hyperbolic Plane

Every motion, i.e. isometric isomorphism, of hyperbolic plane in a Poincare disk model can be given by $f(z) = (az+\bar{b})/(bz+\bar{a})$ with $a\bar{a}-b\bar{b} = 1$. Every motion can be represented as a combination of a rotation around the origin $r_\phi(z) = e^{i\phi}z$ and a translation of the form $t_c(z) = (z + c)/(\bar{c}z + 1)$ where $|c| < 1$.

3 Visualisation

3.1 Extending the Disk Models

4 HyperTesser Description

5 Conclusions and Future Work