

Midwest Dynamical Systems

Limit shapes in groups

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Abstract: Consider larger and larger metric spheres in a group. Under nice circumstances, these converge to a definite "limit shape" as the radius goes to infinity. For instance in finitely generated nilpotent groups one may use the rescaling homothety in the ambient Lie group to shrink down large spheres, and by work of Pansu (extended by Breuillard) this gives a well-defined limit. For a simple example, in the free abelian group Z^2 , if we take the standard generating set, the limit shape is a diamond (and the limiting metric, for which this is the unit sphere, is the L^1 metric on the plane). It is natural to ask whether the counting measure on the discrete spheres converges to a measure on the limit shape. I'll discuss our work on this question, and give some ergodic applications and some averaging applications for limit shapes. Parts of this project are joint work with Samuel Lelievre, Christopher Mooney, and Ralf Spatzier.

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