MARCY BARGE, Montana State University

Maximal equicontinuous factors of Pisot family tiling spaces

We show that the maximal equicontinuous factor of the $\mathbb{R}^n$-action on an n-dimensional Pisot family substitution tiling space is a Kronecker action on an nd-dimensional solenoid, d being the algebraic degree of the eigenvalues of the inflation. The map onto the maximal equicontinuous factor is finite-to-one and a.e. m-to-one for some m: we prove that $m = 1$ if and only if the proximal relation for the $\mathbb{R}^n$-action is closed. Thus the $\mathbb{R}^n$-action has pure discrete spectrum if and only if its proximal relation is closed.

We also show that the pull back of the map onto the maximal equicontinuous factor is injective on 1st integer cohomology with image identifiable as the group of eigenvalues of the tiling flow.

Consideration of the maximal equicontinuous factor leads to the following characterization of minimal directions: If the tiling space is n-dimensional and self-similar Pisot, then the $\mathbb{R}$-action $(T, t) \mapsto T - tv$ is not minimal on the tiling space if and only if v lies in a proper subspace of $\mathbb{R}^n$ spanned by return vectors. In particular, the set of minimal directions is a full measure G_δ with dense complement.