

SEMINARIO DINÁMICOS DE SANTIAGO

TIME (Monday 19th November) 4:30 pm - 5:30 pm

LOCATION CMM (Beauchef 851, Torre Norte, 7mo piso, Sala de Seminarios John Von Neumann)

SPEAKER Arnaldo Nogueira (Université D' Aix-Marseille, Francia)

TITLE On the action of the semigroup of non singular integral matrices on $\mathbb{R}^n$

Abstract.

Let Γ be the multiplicative semigroup of all $n \times n$ matrices with integral entries and nonzero determinant. Let $1 \leq p \leq n-1$ and $V = \mathbb{R}^{np} = \mathbb{R}^n \oplus \dots \oplus \mathbb{R}^n$ (p copies). Consider the action of Γ on V , given by the natural action on each component, by matrix multiplication on the left. Then for $x_{\square} = (x_1, \dots, x_p) \in V$, the Γ -orbit is dense

in V if and only if there is no linear combination $\sum_{j=1}^p \lambda_j x_j$, with $\lambda_j \neq 0$ for some j , which is a rational vector in $\mathbb{R}^n$; in fact the assertion holds also for the orbit of the subgroup $SL(n, \mathbb{Z})$ that is contained in Γ . When x is such that the Γ -orbit is dense, given $y \in \mathbb{R}^{np}$, and $\epsilon > 0$ one may ask for $\gamma \in \Gamma$ such that $|\gamma x - y| < \epsilon$, with a bound on $|\gamma|$ in terms of ϵ .

There has been considerable interest in the literature in quantitative results of this kind, for various group actions. In particular it was shown by Laurent-Nogueira, for $n = 2$, that given an irrational vector x in $\mathbb{R}^2$, any target vector $y \in \mathbb{R}^2$ and $\rho < 1$ there exist 3 infinitely many γ in $SL(2, \mathbb{Z})$ such that $|\gamma x - y| \leq |\gamma|^{-\rho}$. In the talk we will describe some results along this theme for the action of Γ ; for the case $n = 2$ the result is stronger in import than what is recalled above for $SL(2, \mathbb{Z})$, in the sense that the corresponding statement holds for all ρ less than 1, in place of $\frac{1}{2}$ for $SL(2, \mathbb{Z})$.

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The talk is based on a joint work with S.G. Dani.

TIME (Monday 19th November) 5:35 pm - 6:35 pm

LOCATION CMM (Beauchef 851, Torre Norte, 7mo piso, Sala de Seminarios John Von Neumann)

SPEAKER Fabien Durand (Université de Picardie Jules Verne, Francia)

TITLE Decidability of the isomorphism and the factorization for minimal substitution subshifts

ABSTRACT

Classification is a central problem in the study of dynamical systems, in particular for families of systems that arise in a wide range of topics. Hence it is important to have algorithms deciding whether a dynamical system have some given property.

Let us mention subshifts of finite type that appear, for example, in information theory, hyperbolic dynamics, C^* -algebra, statistical mechanics and thermodynamic formalism. The most important and longstanding open problem for this family originates in [Williams:1973] and is stated in [Boyle:2008] as follows : Classify subshifts of finite type up to topological isomorphism. In particular, give a procedure which decides when two non-negative integer matrices define topologically conjugate subshifts of finite type.

Another well-known family of subshifts, that is also defined through matrices, with a wide range of interests is the family of substitution subshifts. These subshifts are concerned, for example, with automata theory, first order logic, combinatorics on words, quasicrystallography, fractal geometry, group theory and number theory. In this talk we will show that not only the existence of isomorphism between such subshifts is decidable but also the factorization.