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CODING OF TWO-DIMENSIONAL CONSTRAINTS OF FINITE TYPE BY SUBSTITUTIONS

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ABSTRACT

We give an automatic method to generate transition matrices associated with twodimensional contraints of finite type by using squared substitutions of constant dimension.

Keywords: Two-dimensional Fibonacci constraints, two-dimensional subshift of finite type, transition matrices, two-dimensional substitutions, finite automata.

1. Introduction

The goal of this paper is to study two-dimensional codes with horizontal and vertical constraints of finite type, and to construct new tools in order to investigate the entropy or capacity of such codes. In current storage devices – magnetic disks and tape drives, and optical disk drives – the recording medium is considered as having one dimension [3, 18, 24]. Hence information is a sequence stored on a track. For instance, for binary information, some practical constraints like this one – bit transitions must not occur too closely – are encountered. A well studied class of codes is the (d, k) - RLL run length-limited codes, with $d \leq k$, where there are at least d 0's, but no more than k 0's, between successive 1's. The (2,7) - RLL code is classical for coding information for example on a magnetic tape, see [3, 18], and the $(1,\infty) - RLL$ is important from a theoretical point of view because it is related to the Fibonacci sequence and to the golden number [15]. These topics are also related to number representation in irrational base, see [16, Chap. 7].