

GENERATORS WITH BOUNDED DECIPHERING DELAY FOR RATIONAL ω -LANGUAGES¹

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ABSTRACT

Given a rational ω -language L , we are interested in the study of some particular generators (i. e. the languages G for which $G^\omega = L$). The most interesting generators of L are those which are ω -codes. It is known that one can decide whether a rational ω -language exhibits prefix-free generators, but the question remains open for ω -codes and for codes with bounded deciphering delay. To unravel this last question, we define here languages with bounded deciphering delay, i. e. languages allowing to perform the decoding of infinite words after some bounded delay, without waiting the whole message. But, contrary to codes with bounded deciphering delay, these languages do not ensure a single deciphering. We show that it is possible to decide whether a rational ω -language exhibits such generators. This allows to derive a few necessary or sufficient conditions for the existence of generators which are codes with bounded deciphering delay.

Keywords: Infinite words, ω -generator, rational language, code with bounded deciphering delay.

1. Preliminaries

This paper is devoted to the *study of generators of a given ω -language L* , which are defined as languages G such that $G^\omega = L$. Some of these generators (when exist), look to be more interesting; the finite ones or the minimal ones are interesting for their size. The generators which are codes are minimal generators and thus belongs to this type.

A generator G can be required to have other useful properties. For example, one can demand that words of L have a single factorization on G ; in this case, G is said to be an ω -code, and it is a minimal generator.

The more interesting ω -codes are the prefix codes, since they allow immediate deciphering of words of L . The existence of prefix codes generating a given rational ω -language was proved to be decidable by I. LITOVSKY [18].

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