GENERATING THE PSEUDO-POWERS OF A WORD

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ABSTRACT

The notions of power of word, periodicity and primitivity are intrinsically connected to the operation of catenation, that dynamically generates word repetitions. When considering generalizations of the power of a word, other operations will be the ones that dynamically generate such pseudo-repetitions. In this paper we define and investigate the operation of θ-catenation that gives rise to the notions of θ-power (pseudo-power) and θ-periodicity (pseudo-periodicity). We namely investigate the properties of θ-catenation, its connection to the previously defined notion of θ-primitive word, briefly explore closure properties of language families under θ-catenation and language operations involving this operation, and propose Abelian catenation as the operation that generates Abelian powers of words.

Keywords: pseudo-power, θ-power, pseudo-primitive, pseudo-periodic, weakly periodic

1. Introduction

Periodicity and primitivity of words are fundamental properties in combinatorics on words and formal language theory. Their wide-ranging applications include pattern-matching algorithms (see e. g. [3], and [4]) and data-compression algorithms (see, e. g., [27]). Sometimes motivated by their applications, these classical notions have been modified or generalized in various ways. A representative example is the "weak periodicity" of [5] whereby a word is called *weakly periodic* if it consists of repetitions of words with the same Parikh vector. This type of period was also called *Abelian period* in [2]. Carpi and de Luca extended the notion of periodic words to that of periodic-like words, according to the extendability of factors of a word [1]. Czeizler,

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