
Words that are square-free, square-free modulo p , and square-free modulo q

Thomas Delépine*¹

¹LIRMM - ALGCo – Laboratoire d’Informatique de Robotique et de Microélectronique de Montpellier
– France

Résumé

A word $w = w_0w_1w_2\dots$ is a sequence of letters over a finite alphabet. In this talk, we are interested in square-free words, that is, words that do not contain any factor of the form $pvvs$, for some words p, v, s . For instance, "banana" contains the square "nana", whereas "watermelon" is square-free.

A word is square-free modulo p if the word $w_0wpw_2p\dots$ is square-free. It is already known that for every $p > 2$, there exist infinite ternary square-free words that are also square-free modulo p .

We generalize this result by characterizing the pairs (p, q) of relatively prime numbers for which there exist infinite ternary square-free words that are square-free modulo p and modulo q , thus answering a question of Harju from 2019.

To prove our results, we used several constructive methods, which allowed us to establish exponential lower bounds on the number of valid words for each admissible pair (p, q) . One of our techniques involves transducers, thus, we will also present some results on square-free transducers.

*Intervenant