

Recent Progress in Combinatorics on Words

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Complexity of the Membership Question

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Abstract

The question whether an n -tuple $(x_1, \dots, x_n) \in \mathbb{Z}_{\geq 0}^n$ is in (A^1, \dots, A^n) , where the A^i are given integer sequences, can sometimes be decided *efficiently* (in polynomial space and polynomial time). More often, depending on the sequences A^i , the answer is unknown, and the best known algorithms are exponential. Our main purpose is to introduce the notion of a probabilistic algorithm for deciding this question for some sequences A_i . The motivation comes from combinatorial game theory, where the (A^1, \dots, A^n) are the second player winning positions.