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Abstract

The Zeckendorf decomposition of a positive integer n is the unique set of nonconsecutive Fibonacci numbers that sum to n. Baird-Smith, et al., defined a game on Fibonacci decompositions of n, called the Zeckendorf Game. This paper introduces a variant of the Zeckendorf Game, called the Accelerated Zeckendorf Game, where a player may play as many moves of the same type as possible on their turn. We prove that a sharp lower bound on the game length of the Accelerated Zeckendorf Game is $k - 1$, where k is the index of the largest term in the Zeckendorf decomposition of n. We conjecture that Player 1 has a winning strategy if $n > 9$. We conjecture that the distribution of game lengths tends to a Gaussian as n goes to infinity, and that the average game length grows sublinearly in n.