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Arithmetic properties of Apéry numbers

Florian Luca and

lgor E. Shparlinski

+ Author Affiliations

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Abstract

Let $(A_n)_{n \ge 1}$ be the sequence of Apéry numbers with a general term given $A_n = \sum_{k=0}^n {\binom{n}{k}}^2 {\binom{n+k}{k}}^2$. In this paper, we prove that both the inequalities $\omega(A_n) > c_0$ log log log n and $P(A_n) > c_0$ (log n log log n)^{1/2} hold for a set of positive integers n of asymptotic density 1. Here, $\omega(m)$ is the number of distinct prime factors of m, P(m) is the largest prime factor of m and $c_0 > 0$ is an absolute constant. The method applies to more general sequences satisfying both a linear recurrence of order 2 with polynomial coefficients and certain Lucas-type congruences.

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