Sondow, Jonathan; **MacMillan, Kieren**

Reducing the Erdős-Moser equation $1^n + 2^n + \cdots + k^n = (k+1)^n$ modulo k and k^2. (English)

Zbl 1233.11038

Integers 11, No. 6, 765-773, A34 (2011).

An open conjecture of Erdős and Moser (from around 1950) is that the only solution of the Diophantine equation $1^n + 2^n + \cdots + k^n = (k+1)^n$ is the trivial solution $1 + 2 = 3$. *Y. Gallot, P. Moree* and *W. Zudilin* [Math. Comput. 80, No. 274, 1221–1237 (2011; Zbl 1231.11038)] showed that if there is a further solution then both k and n must exceed 10^{10^9}. By reducing the equation modulo k^2 the authors find some new conditions that solutions (k, n) have to satisfy. The proofs use divisibility properties of power sums as well as Lerch's relation between Fermat and Wilson quotients.

Reviewer: Pieter Moree (Bonn)

MSC:

11D61	Exponential Diophantine equations
11D79	Congruences in many variables
11A41	Primes

Keywords:

congruence; Eisenstein's relation; Erdös-Moser equaton; Fermat quotient; Lerch's formula; pseudoperfect number; supercongruence; Wilson quotient

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