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Title: A superelliptic equation involving alternating sums of powers

Author(s): Michael A. Bennett

In this short note, we solve completely the Diophantine equation

$$1^k - 3^k + 5^k - \cdots + (4x-3)^k - (4x-1)^k = -y^n,$$

for $3 \leq k \leq 6$. This may be viewed as a “character-twisted” analogue of a classic equation of Schaffer (in which context, it was previously considered by Dilcher). In our proof, we appeal primarily to techniques based upon the modularity of Galois representations and, in particular, to a combination of these ideas with suitable local information.

Address:

Michael A. Bennett
Department of Mathematics
University of British Columbia
Vancouver BC
Canada