
TIMOTHY CALEY, University of Waterloo

A new algorithm for the Prouhet-Tarry-Escott problem

Given natural numbers n and k with $k \leq n - 1$, the Prouhet-Tarry-Escott problem (PTE) asks for distinct sets of integers x_1, \dots, x_n and y_1, \dots, y_n such that

$$\sum_{i=1}^n x_i^j = \sum_{i=1}^n y_i^j$$

for $j = 1, \dots, k$.

This problem has connections to combinatorics and theoretical computer science, as well as to other areas of number theory, such as Waring's problem.

The most interesting case is when $k = n - 1$, which is called ideal. It is an open problem to determine whether ideal PTE solutions exist for a given n , as well as characterizing those that do exist. Computational techniques have been used to search for PTE solutions. In this talk, we present a new algorithm to find PTE solutions, and explain how the results yield additional information.