

Towards Finite-fold Diophantine Representations

Yuri Matiyasevich

Abstract

Celebrated theorem established by Martin Davis, Hilary Putnam, and Julia Robinson in 1961 states that every effectively enumerable set of natural numbers has an exponential Diophantine representation. This theorem was improved by the author in two ways:

- to the existence of Diophantine representation,
- to the existence of so-called *single-fold* exponential Diophantine representation.

However, it remains unknown whether these two improvements could be combined, that is, whether every effectively enumerable set has a single-fold (or at least finite-fold) Diophantine representation.

In the paper we discuss known results about single-fold exponential Diophantine representations, their applications, possible approaches to improving to the case of genuine Diophantine representations, and what would follow if such improvement is impossible.