On the infinitesimals

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Abstract

Our result is the explicit form of the infinitesimals.

1 Introduction

Tropp [Tro02] believed that non-standard analysis provides the most satisfying view of infinitesimals. Parker [Par] stated that analysis can be based on both a constructivist and intuitive view of the infinitesimal. In this paper, we provide the construction of the minimum near zero.

2 Construction of the small number

For any non-negative integer n, it holds

$$10^n = 1 \underbrace{0 \ldots 0}_{n}$$

and

$$10^{-n} = 0. \underbrace{0 \ldots 0}_{n-1} 1.$$

For the infinity W, we define

$$10^W =: 100 \ldots .$$

By deleting the zero, we obtain

$$000 \ldots \to \emptyset 00 \ldots \to 000 \ldots \to \ldots 000.$$

For the infinity W,

$$10^{-W} = 0.| \ldots 001.$$

We use the notation | to separate between the decimal point . and ad infinitum notation $\ldots$. We denote the number $0.| \ldots 001$ by Ψ.

References

[Par]   F. Parker. Infinitesimals: Intuition and rigor. Preprint.

[Tro02] J. A. Tropp. *Infinitesimals: History and Application*. PhD thesis, University of Texas, 2002.