

Computing Sums of Conditionally Convergent and Divergent Series Using the Concept of Grossone

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Let a_1, a_2, \dots be a numerical sequence. In this talk we consider the classical problem of computing the sum $\sum_{n=1}^{\infty} a_n$ when the series is either conditionally convergent or divergent. We demonstrate that the concept of grossone, proposed by Ya. Sergeyev in [1], can be useful in both computing this sum and studying properties of summation methods.

First we prove that within the grossone universe, any rearrangement of a conditionally convergent series does not change the result of summation. This statement is then applied for computing sums of a large class of conditionally convergent series. We do that by splitting the original sum into the difference of two divergent sums with positive terms and expressing the result of summation of both divergent sums in terms of powers of grossone.

We then turn our attention to divergent series and demonstrate that the notion of grossone can simplify the exposition of some summation methods of divergent series as well as the analysis of these summation methods.

Some of the results discussed in this talk have been published in [2].

References

- [1] Sergeyev Ya.D. (2003) *Arithmetic of Infinity*, Edizioni Orizzonti Meridionali, CS.
- [2] Zhigljavsky A. (2012) Computing sums of conditionally convergent and divergent series using the concept of grossone. *Applied Mathematics and Computation*, Vol. 218, pp. 8064–8076.