

(anonymized manuscript) The infinite and contradiction: The history of mathematical physics viewed from mathematical infinities.

1 Introduction

The above history of studies on foundations of mathematics shows that the thought since Plato, which seeks 'a model of reliability and truth' [?] in mathematics, should be corrected. Then what is the role of mathematics in science or in the understanding of Nature by human beings? What is the objective meaning of the process of 'proof', which has been assumed to guarantee the reliability of inferences? These problems seem to be very important to those who are engaged in mathematical studies.

These problems are now left to logicians or philosophers. Moreover, according to J Diudonné, '95% of mathematicians have no interest in works of all the logicians and all the philosophers'. He said, 'The system which satisfies for the moment, say, 95% of mathematicians at least, is the improved and formalized version of the well known system of Zermelo-Frankel. .. '[?]]. 92 Of course, this system is not guaranteed to be consistent, as Zermelo himself said, 'I have not yet even been able to prove rigorously that my axioms are consistent though this is certainly very essential; instead I have to confine myself to pointing out now and then that the antinomies discovered so far vanish one and all if the principles here proposed are adopted as a basis.' [?]

As for the philosophy of mathematics which deals with problems of principles, A Robinson reported:

[In spite of technical progress in foundations of mathematics] the evolution of our understanding of the essential nature of mathematics has been hesitant and ambiguous, and in any case the conclusions that have been reached by one school of thought have been rejected by another.... There is no evidence that a more trenchant kind of progress in this area is at all likely.

As one of possibilities of development in the future, he said:

For example, I can well imagine that a serious mathematical philosophy based on the dialectical approach will make its appearance. It seems to be this approach has already shown its great value in connection with our understanding of the evolution of scientific theories and their

heuristic aspect. As far as detailed analysis of mathematics or of mathematical theory (e.g. the calculus) is concerned, my reading, beginning with Hegel's work in this area, had not led me to find anything that can stand up to serious criticism. It is quite possible that this situation will be remedied in the future' [?].