Infinite series were in the eighteenth century and are still today considered an essential part of the calculus. Indeed, Newton considered series inseparable from his method of fluxions because the only way he could handle even slightly complicated algebraic functions and the transcendental functions was to expand them into infinite series and differentiate or integrate term by term. Leibniz in his first published papers of 1684 and 1686 also emphasized 'general of indefinite equations'. The Bernoullis, Euler, and their contemporaries relied heavily on the use of series. Only gradually, as we pointed out in the preceding chapter, did the mathematicians learn to work with the elementary functions in closed form, that is, as simple analytical expressions. Nevertheless, series were still the only representation for some functions and the most effective means of calculating the elementary transcendental functions.

The successes obtained by using infinite series became more numerous as the mathematicians gradually extended their discipline. The difficulties in the new concept were not recognized, at least for a while. Series were just infinite polynomials and appeared to be treatable as such. Moreover, it seemed clear, as Euler and Lagrange believed, that every function could be expressed as a series. [1]

References

1. Morris Kline. Mathematical Thinking.