PERFACE

To be honest, when Professor Dutta asked me to relase an issue of the journal entirely devoted to the summability methods, I accepted this proposal with some skepticism, because I knew very little about the applications of summability methods to engineering sciences. However, after a short examination, I, fortunately, realized that I was wrong and was assured that summability techniques might have a wide applications in various fields of applied mathematics and engineering sciences.

In the concept of an axiomatically defined abstract fields, there is no place for the sum of infinite number of elements, called infinite series. However, if the field is furnished by some topology on which the algebraic operations of the field are continuous, then the sum of infinite series can be defined quite correctly and might gain exact mathematical content. It was the prominient French mathematician O.L .Cauchy (1789-1857), who in the first decades of the nineteen century unveiled the mist on the Newton's mysterous infinitesimals and put the subject on the firm mathematical ground. Since that time, infinite series has become a powerful and indispensable tool for everyone who has a little concern with mathematics. It is a fact that up to Cauchy, even Newton himself, and many later mathematicians came to very important conclusions by dealing with infinite series. Hoever, with some exceptions, these mathematicians usually dealt with convergent series. In our days the applications of convergent series in engineering sciences are unambiguous and undisputed, and the definition by the limit of partial sums given by Cauchy is still valid. Hoever, generally, when we talk about summability methods it is usually understood summing of divergent series. How can a divergent series be summed? What does its sum mean? We know, for example that

$$\frac{1}{2} + \frac{1}{2^2} + \frac{1}{2^3} + \cdots + \frac{1}{2^n} + \cdots = 1,$$

but what does the expression

$$2 + 2^2 + \cdots + 2^n + \cdots = -1$$

mean? Or, it is clear that

$$1 + 2 + 3 + \cdots + n + \cdots = \infty,$$

then how the equality

$$1 + 2 + 3 + \cdots + n + \cdots = -\frac{1}{12}$$

can be explained? These are some examples of curiosity of summability of divergent series.

This special issue has attempted to bring forward several new summability techniques/methods as well as highlight the significance and relevance of summability techniques in approximation theory, fixed point theory, theory of operators and polynomials, convergent and bounded processes with assignment of speeds, signal processing and in light of fuzzy mathematics. We finally selected 12 papers after completion of necessary review and guest editorial processes.

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