Banach Contraction Principle (1922): More than one century of strong impact in Pure and Applied Mathematics

Adrian Petrușel

Babeș-Bolyai University Cluj-Napoca and Academy of Romanian Scientists, Bucharest, Romania E-mail: adrian.petrusel@ubbcluj.ro

In this talk, we will emphasize the importance of a very general and nice result in Nonlinear Analysis, namely **Banach Contraction Principle**, published in 1922 in the journal Fundamenta Mathematicae by the Polish mathematician Stefan Banach (1892-1945). The huge impact and some of the most important applications in various fields of Mathematics of this principle will be pointed out.

The outline of the talk is as follows:

Section 1. General Models of Operator Equations

Section 2. The Fixed Point Problem

Section 3. Stefan Banach Contraction Principle (1922)

Section 4. Renato Caccioppoli's Contribution to Banach's Contraction Principle (1930)

Section 5. Applications of Banach's Contraction Principle

Section 6. Stefan Banach: the Creator of Modern Functional Analysis

References

[1] Banach, Stefan: Sur les opérations dans les ensembles abstraits et leur application aux équations integrals [On the operations in abstract sets and their application to integral equations], Fund. Math. 3 (1922), 133–181.

[2] Caccioppoli, Renato: Un teorema generale sull' esistenza di elementi uniti in una trasformazione funzionale [A general theorem on the existence of fixed points in a functional transformation], Rendiconti Accad. d. L. Roma (6) 11, 794-799 (1930).

[3] https://mathshistory.st-andrews.ac.uk/Biographies/Banach/

[4] http://kielich.amu.edu.pl/Stefan_Banach/e-index.html