Iterative methods for nonlinear equations with applications

PhD Research

by

Romanus Ogonnaya Michael

Supervisor: **Prof. C.E. Chidume**

ABSTRACT

In our doctoral research, iterative algorithms that approximate solutions of split equality fixed point problems, solutions of generalized mixed equilibrium problems, zeros of monotone maps, and fixed points of some nonlinear maps are constructed. Strong convergence of the sequences generated by these algorithms is established in certain real Banach spaces. Several applications as well as numerical illustrations of the proposed algorithms are provided. Our theorems which are significant contributions in the area of nonlinear operator theory are published in the following articles.

1. C.E. Chidume, **O.M. Romanus**, and U.V. Nnyaba, *An iterative algorithm for solving split equilibrium problems and split equality variational inclusions for a class of nonexpansive-type maps*, **Optimization**, https://doi.org/10.1080/02331934.2018.1503270.
2. C.E. Chidume, **O.M. Romanus**, and U.V. Nnyaba, *Relaxed iterative algorithms for a system of generalized mixed equilibrium problems and a countable family of totally quasi-Phi-asymptotically nonexpansive multi-valued maps, with applications*, **Fixed Point Theory and Appl** (2017), **2017:21**, DOI: 10.1186/s13663-017-0616-x.
3. C.E. Chidume, **O.M. Romanus**, and U.V. Nnyaba, *Strong convergence theorems for a common zero of an infinite family of gamma-inverse strongly monotone maps with applications*, **The Australian Journal of Mathematical Analysis and Applications**, vol. 14, Iss. 1, art. 9, pp. 1-11, 2017.
4. C.E. Chidume, **O.M. Romanus**, and U.V. Nnyaba, *A new iterative algorithm for zeros of generalized Phi-strongly monotone and bounded maps with application*, **British Journal of Mathematics and Computer Science**, 18(1): 1-4, 2016, Article no. BJMCS.25884.
5. C.E. Chidume, **O.M. Romanus**, and U.V. Nnyaba, *an iterative algorithm for solving split equality fixed point problems for a class of nonexpansive-type mappings in Banach spaces*, **Numerical Algorithms**, **(Under review)**.
6. C.E. Chidume, U.V. Nnyaba, **O.M. Romanus** and C.G. Ezea, *Convergence theorems for strictly J-pseudocontractions with application to zeros of gamma-inverse strongly monotone maps*, **PanAmerican Mathematical Journal**, vol. 26(2016), no. 4, 57-76.