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Addendum: On Convergence and Stability of the Generalized Noor Iterations for a General Class of Operators

H. Akewe[1*] and J. O. Olaleru[1]

[1] *Department of Mathematics, University of Lagos, Akoka, Lagos, Nigeria.*

Addendum

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1 Introduction

An error was pointed out by Prof. C. E. Chidume in the statements of our Theorems and Corollaries in [1]. The proof of all the Theorems and Corollaries are correct but the statements have flaws. The correct statements of the results are hereby stated.
We define the multistep iteration as:
Let E be a Banach space and $T : E \to E$ a self map of E. For $x_0 \in E$, the multistep iterative scheme $\{x_n\}_{n=0}^{\infty}$ is defined by

$$\begin{aligned} x_{n+1} &= (1-\alpha_n)x_n + \alpha_n T y_n^1 \\ y_n^i &= (1-\beta_n^i)x_n + \beta_n^i T y_n^{i+1}, i = 1, 2, ..., k-2, \\ y_n^{k-1} &= (1-\beta_n^{k-1})x_n + \beta_n^{k-1} T x_n, \quad k \geq 2 \end{aligned} \tag{1.1}$$

where $\{\alpha_n\}_{n=0}^{\infty}, \{\beta_n^i\}, i = 1, 2, ..., k-1 (with\ k \geq 2)$ are real sequences in [0,1) such that $\sum_{n=0}^{\infty} \alpha_n = \infty$.

2.1. Some Strong Convergence Results in Banach Spaces

Theorem 2.1.1. Let $(E, ||.||)$ be a Banach space, $T : E \to E$ be a selfmap of E with a fixed point p satisfying the condition

$$\|p - Ty\| \leq a\|p - y\|, \tag{2.1}$$

for each $y \in E$ and $0 \leq a < 1$. For $x_0 \in E$, let $\{x_n\}_{n=0}^{\infty}$ be the multistep iterative scheme defined by (1.1). Then $\{x_n\}_{n=0}^{\infty}$ converges strongly to p.

Corollary 2.1.3. Let $(E, ||.||)$ be a Banach space, $T : E \to E$ be a selfmap of E with a fixed point p satisfying the condition

$$\|p - Ty\| \leq a\|p - y\|, \tag{2.2}$$

**Corresponding author: E-mail: hakewe@unilag.edu.ng, hudsonmolas@yahoo.com*

for each $y \in E$ and $0 \leq a < 1$. For $x_0 \in E$, let $\{x_n\}_{n=0}^{\infty}$ be the Noor iterative scheme defined by (1.4) in [1]. Then the Noor iterative scheme converges to p.

Corollary 2.1.5. Let $(E, ||.||)$ be a Banach space, $T : E \to E$ be a selfmap of E with a fixed point p satisfying the condition

$$\|p - Ty\| \leq a\|p - y\|, \tag{2.3}$$

for each $y \in E$ and $0 \leq a < 1$. For $x_0 \in E$, let $\{x_n\}_{n=0}^{\infty}$ be the Ishikawa iterative scheme defined by (1.3) in [1]. Then the Ishikawa iterative scheme converges to p.

Corollary 2.1.6. Let $(E, ||.||)$ be a Banach space, $T : E \to E$ be a selfmap of E with a fixed point p satisfying the condition

$$\|p - Ty\| \leq a\|p - y\|, \tag{2.4}$$

for each $y \in E$ and $0 \leq a < 1$. For $x_0 \in E$, let $\{x_n\}_{n=0}^{\infty}$ be the Mann iterative scheme defined by (1.2) in [1]. Then the Mann iterative scheme converges to p.

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References

[1] Akewe H, Olaleru JO. On convergence and stability of the generalized Noor iterations for a general class of operators, British Journal of Mathematics and Computer Science. 2013;3(3):437-447.

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Dr. Paul Bracken, Department of Mathematics, The University of Texas-Pan American, 1201 W University Dr. Edinburg, TX 78539, USA.