

## ITERATION PROCESS WITH ERRORS FOR LOCAL STRONGLY H-ACCRETIVE TYPE MAPPINGS

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**Abstract.** Some iteration processes of Mann and Ishikawa type with error has been discussed to approximate solution of equation  $Tx = f$ , where  $T$  is locally strongly  $H$  - accretive mapping [18] on uniformly smooth Banach space  $X$ . This extends an earlier result of Liu [9] on iterative processes with errors. We also extend a result of Weng [20] on iterative processes of dissipative type mappings.

**Key Words and Phrases:** Mann iteration process, Ishikawa iteration process, strictly pseudo-contractive map, local strongly  $H$ -accretive map, accretive map, strongly accretive map.

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### REFERENCES

- [1] F.E. Browder, *Nonlinear mappings of nonexpansive and accretive type in Banach spaces*, Bull. Amer. Math. Soc., **73**(1967), 875-882.
- [2] C.E. Chidume, *An iterative process for nonlinear Lipschitzian strongly accretive mappings in  $L_p$  spaces*, J. Math. Anal. Appl., **151**(1990), 453-461.
- [3] C.E. Chidume, *Approximation methods for non-linear operator equations of the  $m$ -accretive type*, to appear in J. Math. Anal. Appl.
- [4] K. Deimling, *Nonlinear Functional Analysis*, Springer-Verlag, New York-Berlin, 1985.

- [5] J.C. Dunn, *Iterative construction of fixed points for multivalued operators of the monotone type*, J. Funct. Anal., **27**(1978), 38-50.
- [6] Jesus Garcia-Falset and Claudio H. Marales, *Existence theorems for  $m$ -accretive operators in Banach spaces*, J. Math. Anal. Appl., **309**(2005), 453-461.
- [7] S. Ishikawa, *Fixed points by a new iteration method*, Proc. Amer. Math. Soc., **44**(1974), 147-150.
- [8] T. Kato, *Nonlinear semigroups and evolution equations*, J. Math. Soc. Japan, **18/19**(1967), 508-520.
- [9] L.S. Liu, *Ishikawa and Mann iterative process with errors for non linear strongly accretive mappings in Banach Spaces*, J. Math. Anal. Appl., **194**(1995), 114-125.
- [10] L.S. Liu, *Fixed points of local strictly pseudo-contractive mappings using Mann and Ishikawa iteration with errors*, Indian J. Pure Appl. Math., **26**(7)(1995), 649-659.
- [11] L.S. Liu, *Mann iteration processes for constructing a solution of strongly monotone operator equations*, J. Eng. Math., **4**(1993), 117-121.
- [12] W.R. Mann, *Mean value methods in iteration*, Proc. Amer. Math. Soc., **4**(1953), 506-510.
- [13] C. Morales, *Pseudo-contractive mappings and Leray-Schauder boundary conditions*, Comment. Math. Univ. Carolina, **20**(1979), 745-746.
- [14] M.O. Osilike, *Ishikawa and Mann iteration methods for nonlinear strongly accretive mappings*, Bull. Austral. Math. Soc., **46**(1992), 413-424.
- [15] S. Reich, *An iterative procedure for constructing zeroes of accretive sets in Banach spaces*, Nonlinear Anal., **2**(1978), 85-92.
- [16] S. Reich, *Constructive techniques for accretive and monotone operators in applied nonlinear analysis*, (V. Lakhshmikantan-Ed.) pp. 335-345, Academic Press, New York, 1979.
- [17] B.E. Rhoades and L. Saliga, *Some fixed point iteration procedures II*, Nonlinear Analysis Forum, **6**(2001), 193-217.
- [18] B.K. Sharma and B.S. Thakur, *Local strongly  $H$ -accretive operators*, (preprint).
- [19] K.K. Tan and H.K. Xu, *Iterative solutions to nonlinear equations of strongly accretive operators in Banach spaces*, J. Math. Anal. Appl., **178**(1993), 9-21.
- [20] X.L. Weng, *Iterative construction of fixed points of a dissipative type operator*, Tamkang J. Math., **23**(1992), 205-215.
- [21] Y. Xu, *Ishikawa and Mann iterative process with errors for nonlinear strongly accretive operator equations*, J. Math. Anal. Appl., **224**(1998), 91-101.
- [22] Z. Xu and G.F. Roach, *A necessary and sufficient condition for convergence of steepest descent approximation to accretive operator equations*, J. Math. Anal. Appl., **167**(1992), 340-354.
- [23] S. Zhang, *On the convergence problems of Ishikawa and Mann iteration process with errors for  $\psi$ - pseudo contractive type mappings*, Appl. Math. Mechanics, **21**(2000), 1-10.

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