

SOME RESULTS ON ASYMPTOTICALLY HEMI-PSEUDOCONTRACTIVE MAPPINGS IN THE INTERMEDIATE SENSE

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Abstract. In this paper, a mapping which is asymptotically hemi-pseudocontractive in the intermediate sense is introduced. Hybrid projection methods are considered for the class of mappings. Strong convergence theorems for common fixed points are established in the framework of Hilbert spaces.

Key Words and Phrases: Asymptotically hemi-pseudocontractive mapping, asymptotically quasi-pseudocontractive mapping in the intermediate sense, fixed point, hybrid projection method.

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REFERENCES

- [1] G. Lopez Acedo, H.K. Xu, *Iterative methods for strict pseudo-contractions in Hilbert spaces*, *Nonlinear Anal.*, **67**(2007), 2258-2271.
- [2] R.P. Agarwal, Y.J. Cho, X. Qin, *Generalized projection algorithms for nonlinear operators*, *Numer. Funct. Anal. Optim.*, **28**(2007), 1197-1215.
- [3] F.E. Browder, W.V. Petryshyn, *Construction of fixed points of nonlinear mappings in Hilbert space*, *J. Math. Anal. Appl.*, **20**(1967), 197-228.
- [4] R.E. Bruck, T. Kuczumow, S. Reich, *Convergence of iterates of asymptotically nonexpansive mappings in Banach spaces with the uniform Opial property*, *Colloq. Math.*, **65**(1993), 169-179.
- [5] W. Cholemiak, S. Suantai, *Convergence theorems from monotone hybrid methods for an infinitely countable family of Lipschitz asymptotically quasi-nonexpansive mappings*, *Nonlinear Anal. Hybrid Syst.*, **4**(2010), 524-530.
- [6] I. Inchan, S. Plubtieng, *Strong convergence theorems of hybrid methods for two asymptotically nonexpansive mappings in Hilbert spaces*, *Nonlinear Anal.*, **2**(2008), 1125-1135.

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- [7] A. Genel, J. Lindenstrass, *An example concerning fixed points*, Israel J. Math., **22**(1975), 81-86.
- [8] K. Goebel, W.A. Kirk, *A fixed point theorem for asymptotically nonexpansive mappings*, Proc. Amer. Math. Soc., **35**(1972), 171-174.
- [9] Y. Kimura, W. Takahashi, *On a hybrid method for a family of relatively nonexpansive mappings in a Banach space*, J. Math. Anal. Appl., **357**(2009), 356-363.
- [10] T.H. Kim, H.K. Xu, *Strong convergence of modified Mann iterations for asymptotically nonexpansive mappings and semigroups*, Nonlinear Anal., **64**(2006), 1140-1152.
- [11] T.H. Kim, H.K. Xu, *Convergence of the modified Mann's iteration method for asymptotically strict pseudo-contractions*, Nonlinear Anal., **68**(2008), 2828-2836.
- [12] W.A. Kirk, *Fixed point theorems for non-Lipschitzian mappings of asymptotically nonexpansive type*, Israel J. Math., **17**(1974), 339-346.
- [13] W.R. Mann, *Mean value methods in iteration*, Proc. Amer. Math. Soc., **4**(1953), 506-510.
- [14] G. Marino, H.K. Xu, *Weak and strong convergence theorems for strict pseudo-contractions in Hilbert spaces*, J. Math. Anal. Appl., **329**(2007), 336-346.
- [15] C. Martinez-Yanes, H.K. Xu, *Strong convergence of the CQ method for fixed point iteration processes*, Nonlinear Anal., **64**(2006), 2400-2411.
- [16] S.Y. Matsushita, W. Takahashi, *A strong convergence theorem for relatively nonexpansive mappings in a Banach space*, J. Approx. Theory, **134**(2005), 257-266.
- [17] K. Nakajo, W. Takahashi, *Strong convergence theorems for nonexpansive mappings and nonexpansive semigroups*, J. Math. Anal. Appl., **279**(2003), 372-379.
- [18] S. Plubtieng, K. Ungchittrakool, *Strong convergence of modified Ishikawa iteration for two asymptotically nonexpansive mappings and semigroups*, Nonlinear Anal., **67**(2007), 2306-2315.
- [19] L. Qihou, *Convergence theorems of the sequence of iterates for asymptotically demicontractive and hemicontractive mappings*, Nonlinear Anal., **26**(1996), 1835-1842.
- [20] X. Qin, S.Y. Cho, H. Zhou, *Strong convergence theorems of fixed point for quasi-pseudo-contractions by hybrid projection algorithms*, Fixed Point Theory, **11**(2010), 347-354.
- [21] X. Qin, S.Y. Cho, J.K. Kim, *Convergence results on asymptotically pseudocontractive mappings in the intermediate sense*, Fixed Point Theory Appl., **2010**(2010), Article ID 186874.
- [22] X. Qin, Y.J. Cho, S.M. Kang, *Convergence theorems of common elements for equilibrium problems and fixed point problems in Banach spaces*, J. Comput. Appl. Math., **225**(2009), 20-30.
- [23] X. Qin, Y.J. Cho, S.M. Kang, M. Shang, *A hybrid iterative scheme for asymptotically k -strict pseudo-contractions in Hilbert spaces*, Nonlinear Anal., **70**(2009), 1902-1911.
- [24] X. Qin, Y.J. Cho, S.M. Kang, H. Zhou, *Convergence theorems of common fixed points for a family of Lipschitz quasi-pseudocontractions*, Nonlinear Anal., **71**(2009), 685-690.
- [25] X. Qin, Y. Su, *Strong convergence theorems for relatively nonexpansive mappings in a Banach space*, Nonlinear Anal., **67**(2007), 1958-1965.
- [26] X. Qin, Y. Su, M. Shang, *Strong convergence theorems for asymptotically nonexpansive mappings by hybrid methods*, Kyungpook Math. J., **48**(2008), 133-142.
- [27] B.E. Rhoades, *Comments on two fixed point iteration methods*, J. Math. Anal. Appl., **53**(1976), 741-750.
- [28] D.R. Sahu, H.K. Xu, J.C. Yao, *Asymptotically strict pseudocontractive mappings in the intermediate sense*, Nonlinear Anal., **70**(2009), 3502-3511.
- [29] J. Schu, *Iterative construction of fixed points of asymptotically nonexpansive mappings*, J. Math. Anal. Appl., **158**(1991), 407-413.
- [30] W. Takahashi, Y. Takeuchi, R. Kubota, *Strong convergence theorems by hybrid methods for families of nonexpansive mappings in Hilbert spaces*, J. Math. Anal. Appl., **341**(2008), 276-286.
- [31] C.M. Yanes, H.K. Xu, *Strong convergence of the CQ method for fixed point iteration processes*, Nonlinear Anal., **64**(2006), 2400-2411.
- [32] H. Zegeye, N. Shahzad, *Strong convergence theorems for a finite family of nonexpansive mappings and semigroups via the hybrid method*, Nonlinear Anal., **72**(2010), 325-329.
- [33] H. Zhou, *Convergence theorems of fixed points for Lipschitz pseudo-contractions in Hilbert spaces*, J. Math. Anal. Appl., **343**(2008), 546-556.
- [34] H. Zhou, *Demiconvexity principle with applications for asymptotically pseudo-contractions in Hilbert spaces*, Nonlinear Anal., **70**(2009), 3140-3145.

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