

## HALPERN TYPE ITERATION WITH TWO MAPPINGS IN A COMPLETE GEODESIC SPACE

HIROYUKI HIRONO\* AND YASUNORI KIMURA\*\*

\*Department of Information Science, Toho University  
Miyama, Funabashi, Chiba 274-8510, Japan  
E-mail: 6519007h@st.toho-u.jp

\*\*Department of Information Science, Toho University  
Miyama, Funabashi, Chiba 274-8510, Japan  
E-mail: yasunori@is.sci.toho-u.ac.jp

**Abstract.** In this paper, we show a strong convergence theorem for the Halpern iteration procedure in a complete CAT(1) space with two quasinonexpansive  $\Delta$ -demiclosed mappings. We consider a sequence of coefficients for convex combination in the iterative scheme and find a certain discontinuity of the limit.

**Key Words and Phrases:** CAT(1) space, quasinonexpansive mapping,  $\Delta$ -demiclosed mapping, Halpern iteration.

**2010 Mathematics Subject Classification:** 47H09, 47H10.

### REFERENCES

- [1] K. Aoyama, Y. Kimura, F. Kohsaka, *Strong convergence theorems for strongly relatively non-expansive sequences and applications*, *J. Nonlinear Anal. Optim., Theory and Applications*, **3**(2012), 67-77.
- [2] M.R. Bridson, A. Haefliger, *Metric Spaces of Non-Positive Curvature*, vol. 319 of "Grundlehren der Mathematischen Wissenschaften", Springer, Verlag, Berlin, Germany, 1999.
- [3] J.S. He, D.H. Fang, G. Lopez, C. Li, *Mann's algorithm for nonexpansive mappings in CAT( $\kappa$ )-spaces*, *Nonlinear Anal.*, **75**(2012), 445-452.
- [4] Y. Kimura, K. Satô, *Halpern iteration for strongly quasinonexpansive mappings on a geodesic space with curvature bounded above by one*, *Fixed Point Theory Appl.*, **2013**(2013), 14 pages.
- [5] K. Nakagawa, *Convergence Theorems to a Common Fixed Point of Two Mappings in CAT(1) spaces*, Master Thesis, Toho University, 2015.
- [6] S. Saejung, *Halpern's iteration in CAT(0) spaces*, *Fixed Point Theory Appl.*, **2010** (2010), Art. ID 471781.
- [7] S. Saejung, P. Yotkaew, *Approximation of zeros of inverse strongly monotone operators in Banach spaces*, *Nonlinear Anal.*, **75**(2012), 742-750.
- [8] R. Wittmann, *Approximation of fixed points of nonexpansive mappings*, *Arch. Math. (Basel)*, **58**(1992), 486-491.

*Received: November 4, 2019; Accepted: January 11, 2020.*