

# THE THRINKING PROJECTION METHOD WITH ALLOWABLE RANGES FOR ZERO POINT PROBLEMS AND ITS APPLICATIONS

SHUNSUKE KAJIBA

## ABSTRACT

In 2008, Takahashi, Takeuchi and Kubota [3] introduced the shrinking projection method which is an iterative method for finding a common fixed point of some families of nonlinear mappings in a Hilbert space. In the shrinking projection method, we need to obtain the exact value of the metric projection to generate a sequence in every step, and it is a task of difficulty. To solve this problem, in 2012, Kimura [1] presented the shrinking projection method with nonsummable errors in a geodesic space. Motivated by Kimura [1], in 2019, Takeuchi [2] proposed another method which is called the shrinking projection method with allowable ranges.

In this talk, we study the shrinking projection method with allowable ranges introduced by Takeuchi [2] for the zero point problem. We obtain strong convergence theorems for finding a zero point of a maximal monotone operator in a Banach space. Moreover, using our results, we discuss the convex minimization problem.

## REFERENCES

1. Y. Kimura, *Approximation of a fixed point of nonexpansive mapping with nonsummable errors in a geodesic space*, Proceedings of the 10th International Conference on Fixed Point Theory and Its Applications, 2012, pp. 157–164.
2. Y. Takeuchi, *Shrinking projection method with allowable ranges*, J. Nonlinear Anal. Optim., **10**(2019), 83–94.
3. W. Takahashi, Y Takeuchi and R. Kubota, *Strong convergence theorems by hybrid methods for families of nonexpansive mappings in Hilbert spaces*, J. Math. Anal. Appl., **341** (2008), 276–286.

(Shunsuke Kajiba) CHIBA REIMEI HIGH SCHOOL, YACHIMATA-SHI, CHIBA, JAPAN; SCHOOL OF SCIENCE AND ENGINEERING, KOKUSHIKAN UNIVERSITY, SETAGAYA-KU, TOKYO, JAPAN

*Email address:* `kajiba@reimei.ac.jp`