Dynamics of Continuous, Discrete and Impulsive Systems
Series **B:** *Applications & Algorithms* **24 (2017)** 371-385

IMPLICIT ITERATIVE METHOD FOR SPLIT VARIATIONAL INCLUSION PROBLEM AND FIXED POINT PROBLEM OF A NONEXPANSIVE MAPPING

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Abstract. In this paper, we introduce and study an implicit iterative method to approximate a common solution of split variational inclusion problem and fixed point problem for a nonexpansive mapping in the setting of real Hilbert spaces. Further, we prove that the sequence generated by the proposed implicit iterative method is continuous and converges strongly to a common solution of split variational inclusion problem and

xed point problem for a nonexpansive mapping which is the unique solution of the variational inequality problem. The results presented in this paper are the supplement, extension and generalization of the previously known results in this area.

Keywords. Split variational inclusion problem; Nonexpansive mapping; Fixed-point problem; Averaged mapping; Implicit iterative method.

AMS (MOS) subject classification: Primary 65K15; Secondary: 47J25, 65J15, 90C33.

1 Introduction

Throughout the paper unless otherwise stated, let H_1 and H_2 be real Hilbert spaces with inner product $\langle \cdot, \cdot \rangle$ and norm $\| \cdot \|$. Let C and Q be nonempty closed convex subsets of H_1 and H_2, respectively.

In 2011, Moudafi [28] introduced the following *split monotone variational inclusion problem* (in short, SpMVIP): Find $x^* \in H_1$ such that

$$0 \in f_1(x^*) + B_1(x^*), \tag{1}$$

and such that

$$y^* = Ax^* \in H_2 \ \text{ solves } 0 \in f_2(y^*) + B_2(y^*), \tag{2}$$

where $B_1 : H_1 \to 2^{H_1}$ and $B_2 : H_2 \to 2^{H_2}$ are multi-valued maximal monotone mappings and $f_1 : H_1 \to H_1$ and $f_2 : H_2 \to H_2$ are nonlinear single valued mappings and $A : H_1 \to H_2$ be a bounded linear operator.