

## GENERAL VARIATIONAL INEQUALITIES AND NONEXPANSIVE MAPPINGS IN HILBERT SPACES

Xiaolong Qin<sup>1</sup>, Meijuan Shang<sup>2,3</sup>, Shin Min Kang<sup>1</sup> and Yongfu Su<sup>3</sup>

<sup>1</sup>Department of Mathematics the RINS  
Gyeongsang National University, Chinju 660-701, Korea

<sup>2</sup>Department of Mathematics  
Shijiazhuang University, Shijiazhuang 050035, China

<sup>3</sup>Department of Mathematics  
Tianjin Polytechnic University, Tianjin 300160, China

**Abstract.** In this paper, we suggest and analyze a three-step iterative scheme for finding the common element of the set of the solutions of the general variational inequalities involving two nonlinear operators and the set of the common fixed point of nonexpansive mappings. We also consider the convergence analysis of the suggested iterative schemes under some mild conditions. Our results improve and extend the corresponding results announced by many others.

**Keywords.** Projection method, relaxed cocoercive mapping, variational inequality, hilbert space, nonexpansive mapping.

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### 1 Introduction and Preliminaries

Variational inequalities introduced by Stampacchia [13] in the early sixties have had a great impact and influence in the development of almost all branches of pure and applied sciences and have witnessed an explosive growth in theoretical advances, algorithmic development, see [1-14,16] and references therein. It combines novel theoretical and algorithmic advances with new domain of applications. Recently variational inequalities have been generalized and extended in several directions using innovative and novel techniques. In 1988, Noor [5] introduced and studied a new class of variational inequalities involving two operators, which is known as general variational inequality. It turned out that odd-order and nonsymmetric obstacle, free, unilateral, nonlinear equilibrium and moving boundary problems arising in various branches of pure and applied sciences can be studied via the general variational inequalities, see [5-11]. It is well known that variational inequalities are equivalent to the fixed point. This alternative equivalent formulation is very important from the numerical analysis point of view and has played a significant part in several numerical methods for solving variational inequalities and complementarity. In particular, the solution of the variational inequalities