INFORMATION ON DOCTORAL THESIS

1. Full name: Nguyen Duc Truong   2. Sex: Male

3. Date of birth: 01/15/1987   4. Place of birth: Vinh Bao, Hai Phong

5. Admission decision number: 1912/QD-DHSPHN2, date: 12/21/2020

6. Changes in academic process:

7. Official thesis title: Some methods for solving variational inequality problems over fixed point sets

8. Major: Mathematical Analysis   9. Code: 946 01 02

10. Supervisors:

>   Supervisor 1: Prof. Dr. Pham Ngoc Anh

>   Supervisor 2: Dr. Hoang Ngoc Tuan

11. Summary of the new findings of the thesis

- Propose and prove the convergence of the hybrid inertial contraction algorithm to solve the variational inequality problem over the fixed point set of demi-contractive mapping sequence.

- Propose and prove the convergence of the inertial parallel approximation algorithm to solve the variational inequality problem over the fixed point set of demi-contractive and demiclose maps. Apply the algorithm to the image processing model.

- Propose and prove convergence of the relaxed projection algorithm, solving the variational inequality problem over a set of fixed points intersecting with the solution set of another variational inequality problem.

- Propose and prove the convergence of the projection contraction algorithm to solve the variational inequality problem on the fixed point set of the solution mapping for another variational inequality problem.

- The thesis is written in 3 chapters, the main results are based on 04 articles published in prestigious international scientific journals: 03 articles in SCIE journal ranked Q2, 01 article in Scopus journal ranked Q3.

12. Paratical applicability, if any: Variational inequality problems as well as fixed point problems have many practical applications, such as image processing models, traffic network balance models, communication network optimization models, etc. In the thesis, the author presented an application of image processing models, applying the algorithm

to solve the variational inequality problem on the fixed point set to restore blurred digital images. The results of the thesis can be used as reference material for the field of Analytical Mathematics, especially Optimization Theory.

13. Further research directions, if any: Research on other extended solutions for variational inequality problems on sets of unknowns in the direction of reducing the conditions placed on the cost function, eliminating projections, eliminating Lipschitz conditions, etc.

14. Thesis-related publications:

[1] Truong, N.D., Kim, J.K., Anh, T.H.H. (2021), Hybrid inertial contraction projection methods extended to variational inequality problems, *Nonlinear Functional Analysis and Applications* 25(1), pp. 161 - 174. (ISSN:1229 - 1595, Scopus, Q3)

[2] Thang, T.V., Anh, P.N., Truong, N.D. (2023), Convergence of the projection and contraction methods for solving bilevel variational inequality problems, *Mathematical Methods in the Applied Sciences* 46(9), 10867 - 10885. (ISSN: 1017 - 1398, SCIE, Q2)

[3] Anh, P.N., Gibali, A., Truong, N.D. (2024), Parallel inertial proximal algorithm with applications to image recovery problems, *Journal of Nonlinear and Convex Analysis* 25(11), pp. 2913 - 2931. (ISSN: 1345 - 4773, SCIE, Q2)

[4] Anh, P.N., Khanh, P.Q., Truong, N.D. (2024), A relaxed projection method for solving bilevel variational inequality problems, *Optimization*, Doi: 10.1080/02331934.2024.2354456. (ISSN: 0233 - 1934, SCIE, Q2)

Date: 5/22/2025

Supervisor   **PhD Student**

Nguyen Duc Truong