

THE UNIVERSITY



OF HONG KONG

*Institute of Mathematical Research
Department of Mathematics*

COLLOQUIUM

A Unified Framework of Splitting and Contraction Algorithms for Convex Optimization in the Sense of Variational Inequalities

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Abstract

Convex optimization problems arising in scientific and engineering computations often involve linear constraints. By introducing the Lagrange multipliers, these problems can be reduced to finding the saddle point of the associated Lagrange function. The saddle point, analogous to a balance point between conflicting interests, is mathematically equivalent to the solution point of a variational inequality (VI). Based on this consideration, we propose a unified framework of splitting and contraction algorithms. Each iteration of the method in this framework consists of a prediction step and a correction step. The predictor is achieved by solving some splitted subproblems, and the updated corrector converges to the set of saddle points (VI solution points) under a certain matrix-norm. Understanding this relatively straightforward framework enables us to design appropriate splitting and contraction methods for various types of convex optimization problems with linear constraints.

Speaker's Biography:

Professor He is a Professor at the School of Mathematics, Nanjing University. He graduated from Nanjing University with a bachelor's degree in 1982 and pursued his doctoral studies in Germany under the supervision of Prof. Stoer, an academician of the Bavarian Academy of Sciences. After obtaining his doctoral degree, he began working in the Mathematics Department of Nanjing University in 1987 and was promoted to professor in 1997.

His distinguished honors include the First-Class Prize of Jiangsu Province Science and Technology Progress Award (2001), the Operations Research Award ORSC (2014), the Outstanding Contribution Award of JS-SIAM (2016), the Second-Class Prize of MOE China (2018), Fellow of ORSC (2024), and the Special Contribution Award of JSOR (2025).

Professor He is widely recognized for his seminal work on the projection and contraction method for variational inequalities and the splitting and contraction method for convex optimization. These algorithms have been widely adopted in engineering applications and extensively cited by internationally renowned scholars. Some have even been incorporated into the graduate curricula of prestigious universities abroad.

Date: March 23, 2026 (Monday)

Time: 4:00 pm - 5:00 pm

Venue: Room 210, Run Run Shaw Building, HKU.

All are welcome