Kewei Wang

wangkw@stu.pku.edu.cn ·

Peking University, Beijing, China

Education

Peking University, Beijing, China Sept. 2020 - June 2024

B.S. in Computational Mathematics, expected June 2024

Research Experience

Research interests: PDE (theoretical and computational), optimization, and relevant topics in applied and mathematics like inverse problem. Also interested in relevant (physical) applications.

Inverse problems in multipopulation mean field games, advised by Prof. Kui Ren, Columbia University

Apr. 2023 - Feb. 2024

- Inverse problem of MFGs (mean field games) is about reconstructing specific cost functions in the MFG system, which is nonlinear and highly coupled.
- Generalized the model of single population MFG to multipopulation cases under several frameworks. Proposed a multi-linearization technique to linearize and analyze the system, which overcomes difficulties posed by nonlinearity.
- Developed and proved several results about uniquely reconstructing cost functions, the most impressive one shows the possibility of unique reconstruction of cost functions from data measured only on a single population component. See Publication for details of this paper.

Acceleration of saddle dynamics, advised by Prof. Lei Zhang, Peking University

Apr. 2022 - Feb. 2023

- HiSD (high-index saddle dynamics) is for searching high-index saddle points, which is initially developed by Prof. Zhang's group in 2019.
- Proposed and implemented several methods to accelerate this algorithm, which was inspired by conjugate gradient method. Implemented techniques including restart strategy to make the methods more stable and efficient. These methods and techniques greatly increased the performance of saddle dynamics.

Publication

1. Kui Ren, Nathan Soedjak, and **Kewei Wang**, *Unique determination of cost functions in a multipopulation mean field game model*, arXiv preprint arXiv 2312.01622. [link]
2. Kui Ren, Nathan Soedjak, **Kewei Wang**, and Hongyu Zhai, *Reconstructing a state-independent cost function in a mean-field game model*, arXiv preprint arXiv 2402.09297. [link]

Awards

- Silver medal, Lin Award (Applied and Computational Mathematics) in S.-T. Yau College Student Mathematics Contest, June 2023.
- Winner of the Written Examination, Hua Award (Analysis and PDEs) and Xu Award (Probability and Statistics) in S.-T. Yau College Student Mathematics Contest, June 2023.
- Meritorious Winner in MCM (Mathematical Contest in Modeling), March 2022.

Miscellaneous

- Programming languages: MATLAB, Python, C/C++.
- Languages: English - Fluent, Chinese (Mandarin and Wu) - Native, Japanese - Beginner.