Qixiu Cheng, PhD

Department of Logistics & Maritime Studies, The Hong Kong Polytechnic University (PolyU)
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Working Experience

Postdoctoral Fellow, Department of Logistics & Maritime Studies, The Hong Kong Polytechnic University (PolyU), Hong Kong, China, 05/2021 – present

Educational Background

PhD, Transportation Engineering, Southeast University (SEU), China, 02/2017 – 03/2021
(Transportation Engineering of SEU ranks #1 nationally in the last China's Discipline Ranking by Ministry of Education)
- Thesis title: Dynamic Traffic Assignment and its Application in Congestion Pricing
- Thesis supervisor: Prof. Zhiyuan Liu

Visiting Student, Arizona State University, USA, 03/2019 – 04/2020
- Supervisor: Prof. Xuesong Zhou

MSc, Transportation Systems Engineering (Double Master Degree with SEU), Monash University, Australia, 03/2015 – 06/2017

MPhil, Transportation Engineering, Southeast University, China, 09/2014 – 12/2016
- Thesis title: The Optimal Toll Rate of Distance-Based Dynamic Congestion Pricing

BEng, Civil Engineering, Changsha University of Science & Technology, China, 09/2010 – 06/2014

Research Interests

Freeway Traffic Management and Control
- Freeway travel time reliability
- Traffic bottleneck analysis, management and control
- Traffic flow theory (macroscopic and microscopic)

Transportation Network Modelling and Optimization
- Dynamic network loading
- Dynamic traffic assignment
- Dynamic congestion pricing

Transportation Big Data Analytics and Urban Informatics
- Multi-source data-driven traffic flow model
- Data fusion technology for traffic state estimation and prediction
- Spatial big data analytics with deep learning

Teaching Experience

Graduate Teaching Assistant, Southeast University, China
- Course: Modelling transportation systems, 2016 – 2018

Journal Papers (* Corresponding Author, in Reverse Chronological Order)

1. **Cheng, Q.**, Liu, Z.*, Guo, J., Wu, X., Pendyala, R., Belezamo, B., & Zhou, X.* (2022). Estimating key traffic state parameters through parsimonious spatial queue models. ***Transportation Research Part C***, 137, 103596. (SCI, IF=8.089, JCR Q1)
2. **Cheng, Q.***, Chen, Y., & Liu, Z. (2022). A bi-level programing model for the optimal lane reservation problem. ***Expert Systems with Applications***, *189*, 116147. (SCI/SSCI, IF=6.954, JCR Q1)
3. Liu, Z.*, Wang, Y., **Cheng, Q.**, & Yang, H. (2022). Analysis of the information entropy on traffic flows. Accepted by ***IEEE Transactions on Intelligent Transportation Systems***. (SCI, IF=6.492, JCR Q1)
4. Xing, J., Wu, W., **Cheng, Q.***, & Liu, R. (2022). Traffic state estimation of urban road network by multi-source data fusion: Review and new insights. *Physica A*, 595, 127079. (SCI, IF=3.263, JCR Q2)

5. Wang, Y., **Cheng, Q.**, Wang, M., & Liu, Z.* (2022). Weibull-distribution-based neural network for capacity estimation. *ASCE Journal of Transportation Engineering, Part A*, *148*(4), 04022009. (SCI, IF=1.774, JCR Q3)
6. Zhou, X.*, **Cheng, Q.**, Wu, X., Li, P., Belezamo, B., Lu, J., & Abbasi, M. (2022). A meso-to-macro cross-resolution approach for connecting polynomial arrival queue model to volume-delay function with inflow-demand-to-capacity ratio. Accepted by ***Multimodal Transportation***.
7. Zhang, J., Wu, W., **Cheng, Q.***, Tong, W.*, Khadka, A., Fu, X., & Gu, Z. (2022). Extracting the complete travel trajectory of subway passengers based on mobile phone data. *Journal of Advanced Transportation*, *2022*, 8151520. (SCI, IF=2.419, JCR Q3)
8. **Cheng, Q.**, Liu, Z.*, Lin, Y., & Zhou, X.* (2021). An s-shaped three-parameter (S3) traffic stream model with consistent car following relationship. ***Transportation Research Part B***, *153*, 246-271. (SCI/SSCI, IF=5.596, JCR Q1)
9. **Cheng, Q.**, Chen, J.*, Zhang, H., & Liu, Z. (2021). Optimal congestion pricing with day-to-day evolutionary flow dynamics: A mean-variance optimization approach. *Sustainability*, *13*(9), 4931. (SCI/SSCI, IF=3.251, JCR Q2)
10. Liu, Z.*, Wang, Z, **Cheng, Q.**, Yin, R., & Wang, M. (2021). Estimation of urban network capacity with second-best constraints for multimodal transport systems. ***Transportation Research Part B***, *152*, 276-294. (SCI/SSCI, IF=5.596, JCR Q1)
11. Chen, Y., Song, X., **Cheng, Q.***, An, Q., & Zhang, Y. (2021). A cordon-based reservation system for urban traffic management. *Physica A*, *582*, 126276. (SCI, IF=3.263, JCR Q2)
12. Selmoune, A., **Cheng, Q.***, Wang, L., & Liu, Z. (2020). Influencing factors in congestion pricing acceptability: A literature review. *Journal of Advanced Transportation*, *2020*, 4242964. (SCI, IF=2.419, JCR Q3)
13. Huang, K., Xu, L., Chen, Y., **Cheng, Q.***, & An, K. (2020). Customized bus route optimization with the real-time data. *Journal of Advanced Transportation*, *2020*, 8838994. (SCI, IF=2.419, JCR Q3)
14. An, Q., Fu, X., Huang, D., **Cheng, Q.**, & Liu, Z.* (2020). Analysis of adding-runs strategy for peak-hour regular bus services. ***Transportation Research Part E***, *143*, 102100. (SCI/SSCI, IF=6.875, JCR Q1)
15. **Cheng, Q.**, Wang, S., Liu, Z.*, & Yuan, Y. (2019). Surrogate-based simulation optimization approach for day-to-day dynamics model calibration with real data. ***Transportation Research Part C***, *105*, 422-438. (SCI, IF=8.089, JCR Q1)
16. Liu, Z.*, Liu, Y., Meng, Q., & **Cheng, Q**. (2019). A tailored machine learning approach for urban transport network flow estimation. ***Transportation Research Part C***, *108*, 130-150. (SCI, IF=8.089, JCR Q1)
17. **Cheng, Q.**, Liu, Z.*, & Szeto, W. Y. (2019). A cell-based dynamic congestion pricing considering travel distance and congestion level. *Transportmetrica B*, *7*(1), 1286-1304. (SCI/SSCI, IF=3.030, JCR Q3)
18. **Cheng, Q.**, Xing, J., Yi, W., Liu, Z.*, & Fu, X. (2019). Distance-based congestion pricing with day-to-day dynamic traffic flow evolution process. *Discrete Dynamics in Nature and Society*, *2019*, 7438147. (SCI, IF=1.348, JCR Q3)
19. Fang, Z., **Cheng, Q.***, Jia, R., & Liu, Z. (2019). Urban rail transit demand analysis and prediction: A review of recent studies. *Smart Innovation, Systems and Technologies*, *98*, 300-309. (EI)
20. **Cheng, Q.**, Liu, Z.*, & Selmoune, A. (2018). Nonlinear distance-based dynamic pricing considering congestion-level correction. *International Journal of Transportation*, *6*(2), 1-8. (ESCI)
21. Gu, Z., Liu, Z.*, **Cheng, Q.**, & Saberi, M. (2018). Congestion pricing practices and public acceptance: a review of evidence. *Case Studies on Transport Policy*, *6*(1), 94-101. (ESCI)
22. Xia, Y., Yang, J., Wang, F., & **Cheng, Q.*** (2018). Impact of battery size and energy cost on the market acceptance of blended plug-in hybrid electric vehicles. *Procedia Computer Science*, *131*, 377-386. (EI)
23. **Cheng, Q.**, Liu, Z.*, Liu, F., & Jia, R. (2017). Urban dynamic congestion pricing: An overview and emerging research needs. *International Journal of Urban Sciences*, *21*(S1), 3-18. (SSCI, IF=2.242, JCR Q3)
24. Liu, Z.*, Wang, S., Zhou, B., & **Cheng, Q**. (2017). Robust optimization of distance-based tolls in a network considering stochastic day to day dynamics. ***Transportation Research Part C***, *79*, 58-72. (SCI, IF=8.089, JCR Q1)

25. Sun, X., Huang, D.*, & **Cheng, Q.** (2016). Optimal nonlinear distance toll for cordon-based congestion pricing considering equity issue. *Journal of Harbin Institute of Technology*, *23*(6), 73-79. (EI)

Journal Papers Under Review (* Corresponding Author)

26. **Cheng, Q.**, Liu, Z., Lin, Y., & Zhou, X. (2022). Stochastic fundamental diagram and freeway capacity: Model formulation, parameter calibration, and potential applications. Under review with ***Transportation Research Part B***.
27. **Cheng, Q.**, Liu, Z., Lu, J., List, G., & Zhou, X. (2022). Travel time reliability on freeways: A frequency-domain approach. Under review with ***Transportation Research Part B***.
28. Zhang, Y., **Cheng, Q.***, Liu, Y., & Liu, Z. (2022). A Gaussian process-based model for transport network flow estimation. Under the 2nd round review with ***Transportmetrica B***.
29. Zhang, K., Zhang, H., **Cheng, Q.**, Wang, Z., & Liu, Z. (2022). A customized two stage parallel algorithm for solving the combined modal split and traffic assignment problem. Submitted to ***Computers & Operations Research***.
30. Wang, Z., Shi, Y., **Cheng, Q.**, Tong, W.*, & Gu, Z. (2022). Car-following models for human-driven vehicles and autonomous vehicles: A systematic review. Under review with ***European Transport Research Review***.
31. Li, L., Zhang, Y., Zhang, W., & **Cheng, Q.*** (2022). GATC and DeepCut: Deep spatiotemporal feature extraction and clustering for large-scale transportation network partition. Under review with ***Physica A***.
32. Xing, J., Liu, R., Zhang, Y., Choudhury, C.F., & **Cheng, Q.*** (2022). Urban network-wide traffic volume estimation under sparse deployment of detectors. Under review with ***Transportmetrica A***.
33. Sun, H., **Cheng, Q.***, & Liu, Z. (2022). An XGBoost-based model for vehicle lane change decision making on the expressway. Submitted to ***Transportmetrica A***.

Working Papers

34. Traffic dynamics modeling with an extended S3 car following model. To be submitted to ***Transportation Research Part B***.
35. A systematic review of traffic flow fundamental diagram and its application in mixed human-driven and autonomous vehicles. To be submitted to ***Transportation Research Part C***.
36. On the instability of Gaussian process in solving bi-level models for transportation problems. To be submitted to ***Transportation Science***.

Conference Papers (* Corresponding Author)

1. **Cheng, Q.**, Liu, Z., Guo, J., Wu, X., & Zhou, X.* (2020). A queueing-theoretic performance model for oversaturated traffic systems. *Proceedings of the 99th Annual Meeting of Transportation Research Board (No. 20-03048)*, Washington D.C., 01/2020.
2. Chen, Y., **Cheng, Q.***, & Liu, Z. (2020). A bi-level programming model for the optimal lane reservation problem. *Proceedings of the 99th Annual Meeting of Transportation Research Board (No. 20-03266)*, Washington D.C., 01/2020.
3. Liu, Y., Lyu, C., **Cheng, Q.**, & Liu, Z.* (2019). Exploring personalization in the application of intelligent transportation systems. *International Workshop on Ride-hailing Algorithms, Applications, and Systems (RAAS 2019) at the 27th ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems*, Chicago, 11/2019.
4. **Cheng, Q.**, Liu, Z., Guo, J., Wu, X., & Zhou, X. (2019). Fluid approximation for traffic system performance evaluation under oversaturated conditions: Model formulation, parameter calibration and applications. *2019 INFORMS Annual Meeting*, Seattle, Washington, 10/2019.
5. Fang, Z., **Cheng, Q.**, Liu, Z.*, & Liu, Y. (2019). A deep learning approach for the traffic assignment problem. *Proceedings of the 98th Annual Meeting of Transportation Research Board* (*No. 19-01956*), Washington D.C., 01/2019.
6. Selmoune, A., **Cheng, Q.**, & Liu, Z.* (2018). Analysis of the influencing factors in the public acceptance of urban congestion pricing practices in Nanjing City. *Proceedings of the 23rd International Conference of Hong Kong Society for Transportation Studies (HKSTS)*, Hong Kong, 12/2018.

7. Xie, X., **Cheng, Q.***, Selmoune, A., Lu, B., & Liu, Z. (2018). A Lagrangian-based approach for reliable user equilibrium considering link travel time variance. *CICTP 2018*, Beijing, 06/2018.
8. Zhou, D., **Cheng, Q.***, An, Q., Lu, B., & Liu, Z. (2018). Link criticality analysis based on reliable shortest path in a network with correlated link travel times. *CICTP 2018*, Beijing, 06/2018.
9. **Cheng, Q.**, & Liu, Z.* (2018). A cell-based dynamic congestion pricing considering travel distance and congestion level. *The 7th International Symposium on Dynamic Traffic Assignment*, Hong Kong, 06/2018.
10. **Cheng, Q.**, Xing, J., Selmoune, A., Fu, X., & Liu, Z.* (2017). Day-to-day dynamics in urban railway networks based on smart card transaction data. *Proceedings of the 22nd International Conference of Hong Kong Society for Transportation Studies (HKSTS)*, Hong Kong, 12/2017.
11. **Cheng, Q.**, Liu, Z.*, & Huang, D. (2016). Dynamic optimal toll with joint distance and congestion. *Proceedings of the 1st Transportation Research Congress (TRC)*, Beijing, 06/2016.

Presentations

1. Zhang, Y., **Cheng, Q.***, Liu, Y., & Liu, Z. (2021). A Gaussian Process-based Model for Transport Network Flow Estimation. *The 4th International Symposium on Multimodal Transportation (ISMT 2021),* Nanjing, 12/2021.
2. **Cheng, Q.**, Liu, Z., Guo, J., Wu, X., & Zhou, X.* (2020). A Queueing-theoretic Performance Model for Oversaturated Traffic Systems. *The 99th Annual Meeting of Transportation Research Board*, Washington D.C., 01/2020.
3. Liu, Y., Lyu, C., **Cheng, Q.**, & Liu, Z.* (2019). Exploring Personalization in the Application of Intelligent Transportation Systems. *International Workshop on Ride-hailing Algorithms, Applications, and Systems (RAAS 2019) at the 27th ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems*, Chicago, 11/2019.
4. Zhou, X.*, **Cheng, Q.**, & Liu, Z. (2019). Data Driven Approach for Calibrating BPR Function as A Queueing Model. *INFORMS Annual Meeting 2019*, Seattle, Washington, 10/2019.
5. **Cheng, Q.**, & Liu, Z.* (2018). A cell-based dynamic congestion pricing considering travel distance and congestion level. *The 7th International Symposium on Dynamic Traffic Assignment*, Hong Kong, 06/2018.
6. **Cheng, Q.**, Xing, J., Selmoune, A., Fu, X., & Liu, Z.* (2017). Day-to-day Dynamics in Urban Railway Networks Based on Smart Card Transaction Data. *The 22nd International Conference of Hong Kong Society for Transportation Studies (HKSTS)*, Hong Kong, 12/2017.

Authorized Patents (in Chinese)

1. Liu, Z., **Cheng, Q.**, Bie, Y., Jing, W., Huang, D., & Huang, K. Congestion charging optimal toll rate determining method based on trial-and-error method and motor vehicle flow. *CN201510883352.0*.
2. Liu, Z., **Cheng, Q.**, Zhang, H., & Zhang, Q. A multiscale demand-and-supply modeling approach for oversaturated transportation systems based on queueing theory. *CN202110350726.8.*
3. Liu, Z., **Cheng, Q.**, Liu, Y., Wei, W., Yu, J., & Li, Z. A method for forecasting the day-to-day dynamic traffic demand based on the neural networks. *CN201810431068.3*.
4. Liu, Z., Wang, L., **Cheng, Q.**, & Yu, J. A method for calculating the optimal toll rate of dynamic congestion pricing based on the cell transmission model. *CN201810418436.0*.

Reviewer

- Transportation Science
- Transportation Research Part B: Methodological
- Transportation Research Part C: Emerging Technologies
- Transportation Research Part D: Transport and Environment
- Transportation Research Part E: Logistics and Transportation Review
- Transportmetrica B: Transport Dynamics
- Journal of Transportation Engineering, Part A: Systems
- Journal of Intelligent Transportation Systems: Technology, Planning, and Operations
- Transportation Letters: The International Journal of Transportation Research

- IET Intelligent Transport Systems
- KSCE Journal of Civil Engineering
- Physica A
- Transport Policy
- Utilities Policy
- Sustainability
- Multimodal Transportation
- Communications in Transportation Research
- Cleaner Logistics and Supply Chain
- Transportation Research Record
- Journal of Advanced Transportation
- Discrete Dynamics in Nature and Society
- Journal of Traffic and Transportation Engineering (English Edition)
- TRB/COTA CICTP/WTC

Academic Experience & Projects

- Dynamic traffic assignment and its application in urban congestion pricing, Scientific Research Foundation of Graduate School of Southeast University, Grant No.: YBPY1885, **PI: Qixiu Cheng**
- Day-to-day Dynamic Flow Evolution Process for Multimodal Transport Network, Graduate Scientific Research Innovation Project of Jiangsu Province, Grant No.: KYCX17_0142, **PI: Qixiu Cheng**
- Impact Analysis of Distance-based Congestion Pricing Schemes on the Multimodal Transport Networks, Youth Project of the National Natural Science Foundation of China, Grant No.: 71501038, PI: Zhiyuan Liu
- Network Design and Optimization Methods of a New Park and Ride Scheme Based on Multimodal Combined Trips, General Project of the National Natural Science Foundation of China, Grant No.: 71771050, PI: Zhiyuan Liu
- Urban Road Traffic Flow Modeling, Simulation, and Optimal Control Method based on Big Data, Key Project of the National Natural Science Foundation of China, Grant No.: 52131203, PI: Zhiyuan Liu
- Optimization and Management for Multimodal Transportation Networks, Distinguished Young Scholar Project of the National Natural Science Foundation of China, Grant No.: 71922007, PI: Zhiyuan Liu
- Analysis and Simulation Platform for the Supply-Demand Balance Mechanism in Multimodal Transportation System, National Key Research and Development Program of China, Grant No.: 2018YFB1600900, PI: Pan Liu

Honors & Awards

- Outstanding Submittal Award of "TRB 2017 Transportation Data Analytics Contest", Awarded by TRB Effects of Information and Communication Technologies on Travel Choices Committee, 2017
- Best Paper Award of the 2nd Transportation Research Congress, 2017
- Outstanding Student Scholarship, Southeast University, 2015~2020
- Excellent Graduate, Hunan Province, 2014
- Outstanding Volunteer, Hunan Province, 2013
- Outstanding Student Scholarship, Changsha University of Science & Technology, 2011~2014

Technical Skills

- Programming Language & Scientific Application: Python, Matlab, Cplex, Gurobi
- Simulation Software: Vissim, Visum, Cube, TransCAD

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