Ping Cao

Professor, School of Management, University of Science and Technology of China

Contact Information

- Office: Room 707A, Management Teaching & Research Building, East District, University of Science and Technology of China (USTC)
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Education

- Ph.D. in Operational Research, Academy of Mathematics and Systems Science, Chinese Academy of Science, Beijing, 2011
  - Dissertation: *Software Reliability Testing: Modeling and Optimization* (in Chinese).
  - Advisor: Prof. Ke Liu.
- B.S. in Mathematics and Applied Mathematics, Department of Mathematics, USTC, Hefei, 2006

Academic Appointment

- 2022.01–present Professor (special appointed), School of Management, USTC, Hefei, China
- 2020.06–2021.12 Associate Professor with tenure, School of Management, USTC, Hefei, China
- 2013.07–2020.05 Associate Professor (tenure-track, special appointed), School of Management, USTC, Hefei, China

Visiting and Working Experience

- 2019.08–2020.04 Research Fellow, National University of Singapore
- 2018.03–2019.03 Visiting Scholar, North Carolina State University, the United States
- 2017.12–2018.01 Research Fellow, City University of Hong Kong, Hong Kong
- 2017.01–2017.03 Research Associate, The Chinese University of Hong Kong, Hong Kong
- 2016.06–2016.07 Research Associate, The Chinese University of Hong Kong, Hong Kong
- 2015.07–2015.10 Research Associate, The Chinese University of Hong Kong, Hong Kong
- 2011.07–2013.07 Post-doctor, Academy of Mathematics and Systems Science, Chinese Academy of Science, Beijing, China
- 2010.09–2011.01 Research Intern, MSCI Inc., Beijing, China

Research Interests

- *Stochastic Optimal Control*
- *Queueing Model*
  - Fluid and Diffusion Approximation

◇ Dynamic Scheduling and Routing

- *Dynamic Contract*
- *Queueing Game*
- *Dynamic Pricing and Revenue Management*
- *Markov Decision Process*

Book

- K. Liu, **P. Cao**. *Markov Decision Processes: Theory and Applications* (in Chinese), Science Press, 2015.

Refereed Journal Papers

1. **P. Cao**, W. Zhou, J. Wu. Optimal Pricing Strategy for a Service Provider in the Presence of Repetitive Usage. *International Transactions in Operational Research*, 29(4), 2022, 2586–2612.
2. **P. Cao**, F. Tian, P. Sun. Comment on "Optimal Contract to Induce Continued Effort". *Management Science*, 68(1), 2022, 796–808.
3. **P. Cao**, Z. Zhong, J. Huang. Dynamic Routing in a Distributed Parallel Many-Server Service System: The Effect of ξ-Choice. *European Journal of Operational Research*, 294(1), 2021, 219–235.
4. **P. Cao**, S. He, J. Huang, Y. Liu. To Pool or Not to Pool: Queueing Design for Large-Scale Service Systems. *Operations Research*, 69(6), 2021, 1866–1885.
5. N. Zhao, Q.Wang, **P. Cao**, J. Wu. Pricing Decisions with Reference Price Effect and Risk Preference Customers. *International Transactions in Operational Research*, 28(4), 2021, 2081–2109.
6. X. Hou, Y. Guo, **P. Cao**. Commission Production Contracts with Revenue Sharing for a Capacitated Manufacturer and Multiple Retailers. *European Journal of Industrial Engineering*, 14(4), 2020, 517–543.
7. **P. Cao**, K.Yang, K. Liu. Optimal Selection and Release Problem in Software Testing Process: A Continuous Time Stochastic Control Approach. *European Journal of Operational Research*, 285(1), 2020, 211–222.
8. **P. Cao**, Y. Wang, J.Xie. Priority Service Pricing with Heterogeneous Customers: Impact of Delay Cost Distribution. *Production and Operations Management*, 28(11), 2019, 2854–2876.
   ◇ Best paper award in the 9th International Workshop on Behavior Operations Management, Shenyang, 2017.
9. N. Zhao, Q.Wang, **P. Cao**, J. Wu. Dynamic Pricing with Reference Price Effect and Price-Matching Policy in the Presence of Strategic Consumers. *Journal of the Operational Research Society*, 70(12), 2019, 2069–2083.
10. Y. Wang, Y. Fan, T. Zhu, **P. Cao**, J. Xie. An Approximation Method for 2-Chain Flexible Queues with Preemptive Priority. *International Journal of Production Research*, 57(19), 2019, 5935–5950.
11. **P. Cao**, N. Zhao, J. Wu. Dynamic Pricing with Bayesian Demand Learning and Reference Price Effect. *European Journal of Operational Research*, 279(2), 2019, 540–556.
12. **P. Cao**, D. Yao. Dual Sourcing Policy for a Continuous-Review Stochastic Inventory System. *IEEE Transactions on Automatic Control*, 64(7), 2019, 2921–2928.
13. **P. Cao**, D.Yao. Optimal Drift Rate Control and Impulse Control for a Stochastic Inventory/Production System. *SIAM Journal on Control and Optimization*, 56(3), 2018, 1856–1883.
    ◇ Outstanding paper youth award in the Operations Research Society of Beijing, Beijing, 2018.

14. **P. Cao**, J. Xie. Optimal Control of an Inventory System with Joint Production and Pricing Decisions. *IEEE Transactions on Automatic Control*, 61(12), 2016, 4235–4240.

15. **P. Cao**, J. Xie. Optimal Control of a Multiclass Queueing System When Customers Can Change Types. *Queueing Systems*, 82(3), 2016, 285–313.

16. J. Xie, **P. Cao**, B.Huang, M. Ong. Determining the Conditions for Reverse Triage in Emergency Medical Services Using Queuing Theory. *International Journal of Production Research*, 54(11), 2016, 3347–3364.

17. **P. Cao**, M. Fan, K. Liu. Optimal Dynamic Pricing Problem Considering Patient and Impatient Customers' Purchasing Behavior. *International Journal of Production Research*, 53(22), 2015, 6719–6735.

18. **P. Cao**, Z. Dong, K. Liu, K.Y. Cai. Quantitative Effects of Software Testing on Reliability Improvement in the Presence of Imperfect Debugging. *Information Sciences*, 218(1), 2013, 119–132.

19. **P. Cao**, J. Li, H. Yan. Optimal Dynamic Pricing of Inventories with Stochastic Demand and Discounted Criterion. *European Journal of Operational Research*, 217(3), 2012, 580–588.

20. X. Yan, **P. Cao**, M. Zhang, K. Liu. The Optimal Production and Sales for a New Production with Negative Word-of-Mouth. *Journal of Industrial & Management Optimization*, 7(1), 2011, 117–138.

21. K. Y. Cai, **P. Cao**, Z. Dong, K. Liu. Mathematical Modeling of Software Reliability Testing with Imperfect Debugging. *Computers & Mathematics with Applications*, 59(10), 2010, 3245–3285.

Conference Papers

1. X. Li, **P. Cao**, F. Wu, L. Liu. Research on Information Centrality in Satellite Network. *International Conference on Electrical, Control and Automation Engineering*, 2013, 591–596.

2. X.Yan, **P. Cao**, M. Zhang, K. Liu. Impacts of Random Capacity and Fluctuating Environment on Inventory Systems. *Proceedings of the IEEE International Conference on Industrial Engineering and Engineering Management*, 2010, 1180–1183.

3. **P. Cao**, Z. Dong, K. Liu. An Optimal Release Policy for Software Testing Process. *Proceedings of the 29th Chinese Control Conference*, 2010, 6036–6041.

Working Papers

- **P. Cao**, D. Yao. Optimal Pricing and Inventory Control Strategies for a Continuous-Review System with Product Return.
- Z. Zhong, **P. Cao**. Balanced Routing with Partial Information in a Distributed Parallel Many-Server Queueing System. Submitted to *European Journal of Operational Research*.
- **P. Cao**, P. Sun, F. Tian. Punish Underperformance with Resting—Optimal Dynamic Contracts in the Presence of Switching Cost.
- **P. Cao**, M. Fan, K. Liu. Dynamic Pricing with Positive Network Externality.
- K. Yang, **P. Cao**, S. Cai, K. Liu. Optimal Software Testing for Minimizing the Testing Times with Given Delivered Reliability.
- **P. Cao**, Z. Dong, K. Liu, K. Y. Cai. Robust Dynamic Selection of Tested Modules in Software Testing Process for Maximizing Delivered Reliability.

Teaching Courses

- *Stochastic Process (B)*
  - ◇ 2020 Autumn

- *Stochastic System: Modelling and Simulation*
  - ◇ 2020–2021 Autumn
- *Data, Model and Decision*
  - ◇ 2017 Autumn, 2021 Autumn
- *Introduction to Dynamic Analysis of Socio-Economical Systems*
  - ◇ 2014–2017 Spring
- *Management Statistics*
  - ◇ 2013–2016 Autumn, 2015 Spring

Research Funds

- National Natural Science Foundation of China for Excellent Young Scholars, *Optimal Control and Optimization of Stochastic Models*, CNY 2 000 000, 2022.01–2024.12, **PI**.
- University Startup Fund, *Pricing and Learning Strategy in Stochastic Service Systems*, CNY 300 000, 2020.09–2022.12, **PI**.
- National Natural Science Foundation of China General Program, *Research of Service Mechanism and Online Dynamic Pricing Policy for Service Firms*, CNY 490 000, 2018.01–2021.12, **PI**.
- National Natural Science Foundation of China Youth Program, *Study on Dynamic Pricing Strategy Considering Retailer's Investment Behavior*, CNY 210 000, 2015.01–2017.12, **PI**.
- Fundamental Research Funds for the Central Universities, *Study on Dynamic Pricing Strategy Under Risk Aversion in Revenue Management*, CNY 50 000, 2014.01–2015.12, **PI**.

Academic Service

- Referee for journals:
  - ◇ *ACM Transactions on Internet Technology*
  - ◇ *Acta Mathematicae Applicatae Sinica* (English Series)
  - ◇ *Communications in Mathematics and Statistics*
  - ◇ *Computers & Industrial Engineering*
  - ◇ *European Journal of Operational Research*
  - ◇ *IEEE Transactions on Automatic Control*
  - ◇ *Information Sciences*
  - ◇ *International Journal of Production Research*
  - ◇ *Journal of the Operational Research Society*
  - ◇ *Journal of Systems Science and Complexity*
  - ◇ *Management Science*
  - ◇ *Naval Research Logistics*
  - ◇ *OMEGA: The International Journal of Management Science*
  - ◇ *Operations Research*
  - ◇ *Quality Technology & Quantitative Management*

- ◇ *SIAM Journal on Control and Optimization*
- ◇ *Sustainable Cities and Society*

- Referee for research grant proposals:
  - ◇ National Natural Science Foundation of China (2018–2021)
  - ◇ Research Grants Council of Hong Kong (2019–2021)
- Mathematical Reviews (MRN: 138018)

Supervised Ph.D. Students

- Wenli Zhou (USTC, expected, 2022), co-advised with Jie Wu.
- Yaolei Wang (USTC, 2020), co-advised with Jingui Xie.
  - ◇ Dissertation: *Priority Service Pricing with Heterogeneous Customer Delay Costs*.
  - ◇ First job placement: post-doc at School of Management, USTC.
- Zhiheng Zhong (CUHK, 2019), co-advised with Junfei Huang and Sean X. Zhou.
  - ◇ Dissertation: *Asymptotic Analysis of Queueing Theory with Healthcare Applications* (CUHK Young Scholars Thesis Award 2019).
  - ◇ First job placement: assistant professor at Business School, Hunan University.
- Nenggui Zhao (USTC, 2019), co-advised with Jie Wu.
  - ◇ Dissertation: *Dynamic Pricing with Reference Price Effect*.
  - ◇ First job placement: assistant professor at School of Management, Hefei University of Technology.

Awards

- 2020 Zhang Zhongzhi Youth Teacher Award
- 2015 Wang Kuancheng Yucai Award (second class prize)
- 2011 Outstanding Winner of Bosera Scholarship, CAS
- 2010 Outstanding Student Scholarship of AMSS, CAS; Yong-An Futures Scholarship of CAS
- 2002–2006 Zhang Zhongzhi Scholarship, twice the Third-Class Outstanding Student Scholarship, the Third-Class New Student Scholarship
- 2000–2002 Twice the First-Class Prize of the National Senior High School Mathematical Contest

Invited Presentations

- 2021.09 USTC Diner Workshop, Hefei, *Punish Underperformance with Resting—Optimal Dynamic Contracts in the Presence of Switching Cost*.
- 2021.08 Workshop on SLA Guarantees for Modern Communication Networks (Online), Huawei, *To Pool or Not to Pool: Queueing Design for Large-Scale Service Systems*.
- 2021.05 Hunan University, Changsha, *Optimal Dynamic Contract with "Good" Arrival*.
- 2020.11 Virtual 2020 INFORMS Annual Meeting, *Priority Queues with Upgrades*.
- *The Value of ξ-Choice: Dynamic Routing in a Many-Server Parallel Service System*
  - ◇ 2019.07 Beijing University of Posts and Telecommunications, Beijing

    ◇ 2019.07 CSAMSE Conference, Chengdu

- *Priority Service Pricing with Heterogeneous Customers: Impact of Delay Cost Distribution*
    ◇ 2019.07 CSAMSE Conference, Chengdu
    ◇ 2019.06 EURO-K Conference, Dublin
- 2017.07 CASME Conference, Guangzhou, *Optimal Drift Rate Control and Impulse Control for a Stochastic Inventory/Production System*.
- 2016.12 Academy of Mathematics and Systems Science, Chinese Academy of Science, Beijing, *Online Priority Service Pricing with Heterogeneous Customers*.
- 2015.11 INFORMS Annual Meeting, Philadelphia, *Join the Shortest Queue with Many Servers*.

This curriculum vitae is current as of February 1, 2022.