MELVYN SIM

Department of Analytics & Operations
NUS Business School
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Date: April 2020

Education

Massachusetts Institute of Technology, Cambridge MA
PhD in Operations Research, June 2004
Thesis: Robust Optimization
Advisor: Dimitris J. Bertsimas, MIT

Singapore-MIT-Alliance
S.M. (HPCES), July 2000.

National University of Singapore
M.Eng. (EE), July 1996.

National University of Singapore
B.Eng. (EE) awarded First Class Honors, July 1995.

Academic and Professional Experience

1. Head, Department of Analytics & Operations, 2017 - Present
2. Professor and Provost's Chair, April 2016 – Present
3. Courtesy appointment at Industrial and Systems Engineering, Jan 2016 - Present
4. Deputy Director, NUS Global Asian Institute, Aug 2012 - Present
5. Professor, Jan 2012 - Present
6. Dean's Chair, July 2009 – 2012
7. Deputy Head, Decision Sciences, May 2009 – July 2011.
8. Associate Professor (with tenure), Decision Sciences, July 2008 – Dec 2011
9. NUS Risk Management Institute Affiliated Researcher, 2007 - 2016
10. Fellow, Singapore-MIT-Alliance, 2004 - 2008
11. Assistant Professor, Decision Sciences, NUS, 2004 - 2008
12. Senior Tutor, Decision Sciences, NUS, 2000 - 2004
13. Research Engineer, Singapore Ministry of Defense, 1997 - 1999

Area of Expertise

1. Optimization and Decision Making under Uncertainty
2. Prescriptive Analytics and Applications in Operations/Healthcare systems/Transportation

Honors and Awards

1. NUS Business School Outstanding Researcher Award, 2010/2011
2. NUS Young Researcher Award, 2009
3. Recognition list for NUS Business School Outstanding Researcher Award, 2008/2009
4. Nominee for University Young Researcher Award, 2008/09
5. Nominee for Outstanding University Researcher Award, 2008/09
6. First place, INFORMS Junior Faculty Interest Group (JFIG) Best Paper Competition, November 2007
7. NUS Business School Outstanding Researcher Award, 2007/2008
8. Department of Decision Sciences Outstanding Researcher Award, 2005/2006
9. Nominee for University Young Researcher Award, 2005/06
10. Second place, INFORMS George Nicholson Student Paper Competition, Oct 2004
11. Second place, INFORMS George Nicholson Student Paper Competition, Nov 2002
12. NUS Overseas Graduate Scholarship, June 2000

Research Grants

1. Co-PI, Service Productivity and Innovation Research (SPIRE), S$4,119,439, Social Science Research Thematic Grant, Ministry of Education, June 2017-May 2022.
2. Principal Investigator. Singapore-MIT Alliance for Research and Technology. Project: Route Choice Optimization and Equilibrium Analysis On Uncertain Transportation Network Under Risk and Ambiguity. 2011-2012. Budget $48,000.
3. Principal Investigator. ExxonMobil Research and Engineering Company grant, USA. Project: Robust Production Optimization. 2011-2012. Grant of US$75,000
4. Principal Investigator. ExxonMobil Research and Engineering Company grant, USA. Project: Robust Production Optimization. 2010-2011. Grant of US$60,000.
5. Principal Investigator. ExxonMobil Research and Engineering Company grant, USA. Project: A Robust Optimization Approach to the Inventory Routing Problem with Uncertainties. 2009-2010. Grant of US$50,000.
6. Principal Investigator. NUS grant, Singapore. Project: Robust Optimization: A tractable approach to optimization under uncertainty. 2004-2007. Grant of S$21,000
7. Principal Investigator. NUS grant, Singapore. Project: A unifying framework of stochastic optimization and robust optimization. 2005- 2009. Grant of S$71,400
8. Co-Principal Investigator. Singapore-MIT Alliance grant, Singapore. Project: Robust Optimization. 2005 – 2010. Grant of S$700,000.

Software

1. ROME – Robust Optimization Made Easy. Co-developed with Joel Goh. http://robustopt.com
2. RSOME – Robust Stochastic Optimization Made Easy. Developed by Peng Xiong and Zhi Chen. https://www.rsomerso.com

Publications

Journal Articles- International Refereed

1. Y. Zhang, Z. Zhang, A. Lim, M. Sim. 2020. Robust Data-Driven Vehicle Routing with Time Windows. Forthcoming in Operations Research.
2. Z. Chen, M. Sim, P. Xiong. 2020. Robust Stochastic Optimization Made Easy with RSOME. Forthcoming in Management Science.
3. LTK Hien, M. Sim, H. Xu. 2020 Mitigating Interdiction Risk with Fortification. Operations Research. 68(2), 309-654.
4. Yang, M. Sim and H. Xu. 2019. Goal Scoring, Coherent Loss and Applications to Machine Learning. Mathematical Programming. https://doi.org/10.1007/s10107-019-01387-y
5. S. He, M. Sim and M. Zhang. 2019. Data-Driven Patient Scheduling in Emergency Departments: A Hybrid Robust–Stochastic Approach. Management Science. 65(9), 4123-4140.
6. Z. Chen, M. Sim, H. Xu. 2019. Distributionally Robust Optimization with Infinitely Constrained Ambiguity Sets. Operations Research, 67(5), 1328-1344.
7. Y. Zhang, R. Baldacci, M. Sim, J. Tang. 2019. Routing Optimization with Time Windows under Uncertainty. Mathematical Programming, 175(1-2), 263-305.
8. J. Zhen, D. den Hertog, M. Sim. 2018. Adjustable Robust Optimization via Fourier-Motzkin Elimination. Operations Research, 66(4),1086-1100.
9. D. Bertsimas, M. Sim and M. Zhang. 2019. Adaptive Distributionally Robust Optimization. Management Science, 65(2), 604-618.
10. K. Natarajan, M. Sim and Joline Uichanco. 2017. Asymmetry and Ambiguity in Newsvendor Model. Management Science, 64(7), 3146-3167.
11. J. Qi, M. Sim, D. Sun, X. Yuan. 2016. Preferences for Travel Time under Risk and Ambiguity: Implications in Path Selection and Network Equilibrium. Transportation Research Part B: Methodological, 94, 264-284.
12. P. Jaillet, J Qi, M. Sim, 2016. Routing Optimization under Uncertainty. Operations Research, 64(1), 186-200.
13. F. Meng, J. Qi, M. Zhang, Ang, S. Chu, M. Sim. 2015. A Robust Optimization Model for Managing Elective Admission in a Public Hospital. Operations Research, 63(6), 1452-1467.
14. L.G. Chen, D.Z. Long, M. Sim. 2015. On Dynamic Decision Making to Meet Consumption Targets. Operations Research, 63(5), 1117-1130.
15. N. Hall, DZ. Long, J. Qi, M. Sim. 2015. Managing Underperformance Risk in Project Portfolio Selection. Operations Research, 63(3), 660-675.
16. W. Wiesemann, D. Kuhn, M. Sim. 2014. Distributionally Robust Convex Optimization. Operations Research, 62(6), 1358-1376.
17. S-W. Lam, T-S. Ng, M. Sim, J-H Song. 2013. Multiple Objectives Satisficing under Uncertainty. Operations Research, 61(1), 214-227.
18. J. Goh, KG Lim, M. Sim and W. Zhang. 2012. Portfolio Value-at-Risk Optimization for Asymmetrically Distributed Asset Returns. European Journal of Operational Research, 221(2), 397-406, 2012.
19. C-K. Low, D. Pachamanova and M. Sim. 2012. Skewness-Aware Asset Allocation: New Theoretical Observations and Empirical Evidence. Mathematical Finance, 22(2), 379-410.
20. D. Brown, E. De Giorgi and M. Sim. 2012. Aspirational Preferences and their Representation by Risk Measures. Management Science, 58(11), 2095-2113.
21. M. Ang, Y-F. Lim and M Sim. 2012. Robust Storage Assignment in Unit-Load Warehouses. Management Science, 58(11), 2114-2130.

22. J. Goh and M. Sim. 2011. Robust Optimization Made Easy with ROME. Operations Research, 59(4), 973-985.
23. K. Natarajan, M. Sim and Joline Uichanco. 2010. Tractable Robust Expected Utility and Risk Models for Portfolio Optimization. Mathematical Finance, 20(4), 695 -731.
24. J. Goh and M. Sim. 2010. Distributionally Robust Optimization and its Tractable Approximations. Operations Research, 58(4), 902-917
25. C-T. See and M. Sim. 2010. Robust Approximation to Multi-Period Inventory Management. Operations Research, 58(3), 583 – 594.
26. W. Chen, M. Sim. 2009. Goal Driven Optimization. Operations Research, 57(2), 342-357.
27. C. Wang, C-J. Ong and M. Sim. 2010. Model Predictive Control Using Segregated Disturbance Feedback. IEEE Transactions on Automatic Control, 55(4), 831 - 840.
28. W. Chen, M. Sim, J. Sun and C-P Teo. 2010. From CVaR to Uncertainty Set: Implications in Joint Chance Constrained Optimization, Operations Research, 58, 470-485
29. C. Wang, C-J. Ong and M. Sim. 2009. Convergence Properties of Constrained Linear System under MPC Control Law using Affine Disturbance Feedback. Automatica, 45(7), 1715-1720.
30. K. Natarajan, D. Pachamanova and M. Sim. 2009. Constructing Risk Measures from Uncertainty Sets. Operations Research, 57(5), 1129-1141.
31. D. Brown and M. Sim. 2009. Satisficing Measures for Analysis of Risky Positions. Management Science, 55(1), 71-84.
32. C. Wang, C-J. Ong and M. Sim. 2008. Constrained Linear System with Disturbances: Stability under Disturbance Feedback. Automatica, 44(10), 2583-2587.
33. K. Natarajan, D. Pachamanova and M. Sim. 2008. Incorporating Asymmetric Distributional Information in Robust Value-at-Risk Optimization. Management Science, 54(3), 573-585.
34. X. Chen, M. Sim, P. Sun and J. Zhang. 2008. A Linear-Decision Based Approximation Approach to Stochastic Programming. Operations Research, 56(2), 344-357.
35. X. Chen, M. Sim and P. Sun. 2007. A Robust Optimization Perspective on Stochastic Programming. Operations Research, 55(6), 1058-1071.
36. X. Chen, M. Sim, D. Simchi-Levi and P. Sun. 2006. Risk Aversion in Inventory Management. Operations Research, 55(5), 828-842.
37. D. Bertsimas and M. Sim. 2006. Tractable Approximations to Robust Conic Optimization Problems Dimitris Bertsimas. Mathematical Programming, 107(1), 5 – 36.
38. D. Bertsimas, D. Pachamanova and M. Sim. 2004. Robust Linear Optimization under General Norms. Operations Research Letters, 32(6), 510-516.
39. D. Bertsimas and M. Sim. 2004. Price of Robustness. Operations Research, 52(1), 35-53. i
40. D. Bertsimas and M. Sim. 2003. Robust Discrete Optimization and Network Flows. Mathematical Programming, 98, 49-71.
41. H-C Lau, K-M Teo and M. Sim. 2003. Vehicle Routing Problem with time-Windows and a Limited Number of Vehicles. European Journal of Operational Research, 148(3), 559-569.
42. C.S. Chang and S.S Sim. 1997. Optimising Train Movements through Coast Control using Genetic Algorithms. IEE Proceedings-Electric Power Applications, 44(1), 65-73.

Conference Articles- International Refereed

43. Yang, W, M. Sim, X. Xu. The Coherent Loss Function for Classification. International Conference on Machine Learning, pp. 37–45, 2014

Chapters in Books

44. M. Sim. 2009. The Price of Robustness for Linear Optimization Problems, Encyclopedia of Optimization.
45. M. Sim. 2009. Approximations to Robust Conic Optimization Problems, Encyclopedia of Optimization.

Permanent Working Papers

46. D. Bertsimas and M. Sim. 2004. Robust Discrete Optimization and Downside Risk Measures. Working Paper.
47. M. Ang, M. Chou, M. Sim, R. So. 2012. A Robust Optimization Framework for Analyzing Distribution Systems with Transshipment under Distributional Ambiguity. Working Paper.

Membership of conference committees

1. Judge for INFORMS M&SOM Student Paper Competition, 2000, 2011, 2012, 2013, 2013.
2. Judge for INFORMS George Nicholson Student Paper Competition, 2001, 2008.
3. Stream organizer on robust optimization, International Conference on Continuous Optimization, McMaster University, Canada, Aug 2007
4. Local Organizing Committee Chair for the Third Sino-Japanese Optimization Meeting, 2005.

Editorial services

1. Associate Editor, Mathematical Programming Computation. 2008 - Present.
2. Associate Editor, Management Science, 2009 - Present.
3. Associate Editor, Operations Research, 2012 - Present.
4. Associate Editor, INFORMS Journal on Optimization, 2017 – Present.

Invited presentations

1. Plenary speaker, Optimization 2020, Aveiro, Portugal, July 2020 (cancelled).
2. Semi-plenary speaker, International Symposium on Mathematical Programming, Bordeaux, France, July 2018.
3. Plenary speaker, Robust Optimization in Applied Probability, European Institute for Statistics, Probability, Stochastic Operations Research and their Applications, Eindhoven, The Netherlands, Nov 2015.
4. Keynote speaker, The Asian Association of Management Science and Applications, Dalian, China, Sep 2015.
5. Keynote speaker, Spring seminar, CUSO Doctoral Program, Zinal, Switzerland, Jan 2015
6. Invited tutorial speaker, POMS International, Singapore, July 2014
7. Invited speaker, ISB, India, Oct 2014
8. Invited speaker, HK Poly University, Hong Kong, Oct 2013

9. Plenary speaker, 9th International Conference on Computational Management Science, Imperial College London, April 2012.
10. Invited speaker, OM Seminar, Nangyang Business School, NTU, Aug 2011.
11. Invited speaker, Mostly OM Workshop, Tsinghua University, China, May 2010
12. Invited speaker, HKUST, Hong Kong, May 2010
13. Invited speaker, Hong Kong Polytechnic University, May 2010
14. Invited speaker, City University of Hong Kong, Hong Kong, Dec 2009.
15. Invited speaker, Helsinki University of Technology, Helsinki, Finland, March 2009.
16. Plenary speaker, 3rd Nordic Optimization Symposium, Stockholm, Sweden, March 2009.
17. Invited speaker, International Forum on Management Science and Operations Research, Jinan, China, June 2009.
18. Invited speaker, International Symposium on Supply Chain Management, Sanya, China, Dec 2008.
19. Invited speaker, Integrated Risk Management in Operations and Global Supply Chain Management, Singapore Management University, August 2008.
20. Invited lecturer on Robust Optimization, Shanghai Jiao Tong University, China, May 2008.
21. Invited seminar speaker, Hong Kong University of Science and Technology, Oct 2007.
22. Co-lecturer with Ahraon Ben-Tal, Robust Optimization Summer School organized by the Institute of Systems Analysis and Computer Science (IASI), Italy, July 2007.
23. Semi-plenary Speaker, International Conference on Continuous Optimization, McMaster University, Canada, Aug 2007.
24. Invited speaker, Symposium on Optimization & Applications, Hong Kong University, June 2006.
25. Invited speaker, Workshop on Large-Scale Robust Optimization, Sandia Labs, Santa Fe, NM, Aug 2005.
26. Invited speaker at Schloss Dagstuhl, Germany, Jan 2005.
27. Invited speaker, Nicholson award, INFORMS, Denver, Oct 2004.
28. Invited speaker, Nicholson award, INFORMS San Jose, Nov 2002.

Modules taught

1. BDC6218/9: Seminars in Optimization – Robust Optimization
2. BDC1007: Business Analytics: Models and Decisions
3. BDC6111: Foundations of Optimization
4. BDC5111: Linear Programming
5. DSC2003: Management Science
6. DSC2006: Operation Management
7. CE5231: Tech and Tools (Singapore-MIT-Alliance (SMA))
8. BDC6400A Selected Topics in DS – Robust Optimization
9. DSC3124: Introduction to Optimization

Research students supervised

Graduated PhD students

1. Wenqing Chen. NUS Business School. Graduated 2007. Grab, Singapore.
2. Chuen-Teck See. Industrial and Systems Engineering, NUS. Graduated 2010.

3. Chen Wang. Mechanical Engineering, NUS. Graduated 2010. Co-supervised with Ong Chong Jin.
4. Shao-Wei Lam. Industrial and Systems Engineering, NUS. Graduated 2010. Co-supervised with Adam Ng.
5. Zhuoyu Long. Decision Science, NUS Business School. Graduated 2013. Faculty at CUHK Industrial Engineering Department, Hong Kong
6. Jin Qi. Decision Science, NUS Business School. Graduated 2014. Faculty at IELM, HKUST, Hong Kong.
7. Meilin Zhang. Decision Science, NUS Business School. Graduated 2015. Faculty at SUSS, Singapore.
8. Chen Zhi. DAO, NUS Business School. Graduated 2017. Assistant Professor in City University of Hong Kong. Finalist in 2017 George Nicholson Competition.
9. Jianzhe Zhen. Tilburg University. Graduated 2018. Co-supervise with Dick den Hertog.
10. Gar-Goei Loke. Department of Mathematics, NUS. Graduated 2019. Co-supervise with Kim-Chuan Toh.
11. Qinshen Tang, NUS Business School. Graduated 2017. Faculty as NTU Business School.
    a. Honorable Mention, POMS-HK Best Student Paper Competition, Hong Kong, 2019.
    b. Honourable Mention, POMS College of SCM, Best Student Paper Competition, Washington DC, 2019.

<u>Graduated Master Students</u>

1. Daizhuo Chen, Singapore MIT-Alliance. Graduated 2010. Purshe PhD student at Columbia Business School.
2. Thomas Ou, The Logistic Institute, Asia Pacific. Graduated 2007.
3. Joline Uichanco, Singapore-MIT-Alliance. Graduated 2008.
4. Jeremy Chen, Singapore-MIT-Alliance. Graduated 2008.

Service to the University

1. Head, Department of Analytics & Operations, Jan 2017 - Present
2. University Teaching Evaluation Committee, Oct 2015 – 2016.
3. Chair, Faculty PhD Committee, NUS Business School, July 2013 – 2015
4. University Promotion and Tenure Committee, Aug 2013 – Present.
5. EXCO, Department of Decision Sciences, July 2011 - 2013
6. Faculty Promotion and Tenure Committee, Jan 2010 – 2013.
7. Chair, Department Evaluation Committee, July 2009 – June 2011
8. Chair, Department Teaching Committee, July 2009 – June 2011
9. Member, Faculty PhD Committee, NUS Business School, July 2009 – 2013.
10. Deputy Head, Department of Decision Sciences, May 2009 – June 2011
11. Member, Department PhD Committee, Jan 2008 – 2015.
12. Member, Department Search Committee, July 2007 – June 2011.
13. Department of Decision Sciences Seminar Coordinator, July 2004 – July 2007.