

Zheng Qu

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Nationality : Chinese

Professional Experience

- 09/2015- **Assistant Professor.** DEPARTMENT OF MATHEMATICS, UNIVERSITY OF HONG KONG, HONG KONG.
- 01/2014-08/2015 **Postdoctoral researcher.** SCHOOL OF MATHEMATICS, UNIVERSITY OF EDINBURGH, UNITED KINGDOM.

Education

- 2010-2013
(3 years) **PhD in Applied Mathematics.** ÉCOLE POLYTECHNIQUE, FRANCE.
Thesis title "Numerical solutions of high dimensional optimal control problems and nonlinear Perron-Frobenius theory", under the direction of Stéphane Gaubert (INRIA and CMAP, École Polytechnique) and Shanjian Tang (Fudan University, Shanghai), thesis defended in Oct. 2013
- 2009-2010
(1 year) **Master in Applied Mathematics.** UNIVERSITÉ PIERRE ET MARIE CURIE, FRANCE.
Program "Optimization, Game theory and Modelling in Economics". Master thesis title "Stochastic algorithms for an optimized operation of a transport system for self-service and complexity studies", under the direction of Frédéric Meunier (CERMICS, ENPC).
- 2009-2010
(1 year) **Engineering degree of École des Ponts et Chaussées.** FRANCE.
Additional training program of Polytechnique engineering cycle. Department IMI (Ingénierie des mathématiques et de l'informatique).
- 2006-2010
(4 years) **Engineering degree of École Polytechnique.** FRANCE.
Program "Optimization, Communication and Signal processing". Research report title : "Scheduling of coupled tasks and applications on radar", under the direction of Philippe Baptiste (CNRS, LIX).
- 2003-2006
(3 years) TONGJI UNIVERSITY, CHINA.
First three years of education for Bachelor's degree in Applied Mathematics. Interruption of study after being admitted to École Polytechnique.

Research Interests

Big data optimization : randomized coordinate descent (serial, parallel, distributed, accelerated and primal-dual variants), semi-stochastic gradient descent, complexity analysis, Fenchel duality, convex analysis, algorithm design, high performance computing, random set theory, applications in machine learning.

Optimization, operations research and optimal control : approximate dynamic programming, facility location, semidefinite programming, Hamilton-Jacobi equations, numerical methods, attenuation of the curse of dimensionality.

Nonlinear analysis : ergodicity coefficients, non-commutative consensus, monotone or non-expansive operators, nonlinear Perron-Frobenius theory, variational analysis, Finsler metric.

Publications & preprints

Preprints

1. Olivier Fercoq, **Zheng Qu** : Restarting accelerated gradient methods with a rough strong convexity estimate, *submitted*, *arXiv :1609.07358*, 2016.
2. Jakub Konečný, **Zheng Qu** and P. Richtárik. S2CD : Semi-stochastic coordinate descent, *submitted*, *arXiv :1412.6293*, 2014.

Journal Publications

3. Stephane Gaubert, **Zheng Qu** : Checking the strict positivity of Kraus maps is NP-hard, *Information Processing Letters*, 118 :35-43, 2017. DOI= 10.1016/j.ipl.2016.09.008.
4. **Zheng Qu**, Peter Richtárik. Coordinate descent with arbitrary sampling I : algorithms and complexity, *Optimization Methods and Software*, 31(5) :829-857, 2016. DOI :10.1080/10556788.2016.1190360.
5. **Zheng Qu**, Peter Richtárik. Coordinate descent with arbitrary sampling II : expected separable overapproximation, *Optimization Methods and Software*, 31(5) :858-884, 2016. DOI :10.1080/10556788.2016.1190361.
6. Stephane Gaubert, **Zheng Qu** and Srinivas Sridharan : Maximizing concave piecewise affine functions on the unitary group, *Optimization Letters*, 10(4) :655-665 , 2016. DOI :10.1007/s11590-015-0951-y.
7. Stephane Gaubert, **Zheng Qu** : Dobrushin ergodicity coefficient for Markov operators on cones, *Integral Equations and Operator Theory*, 81(1) :127-150, 2014. DOI : 10.1007/s00020-014-2193-2.
8. **Zheng Qu** : Contraction of Riccati flows applied to the convergence analysis of a max-plus curse of dimensionality free method, *SIAM Journal on Control and Optimization*, 52(5) :2677-2706, 2014. DOI : 10.1137/130906702.
9. Stephane Gaubert, **Zheng Qu** : The contraction rate in Thompson metric of order-preserving flows on a cone - application to generalized Riccati equations, *Journal of Differential Equations*, 256(8) :2902-2948, 2014. DOI : 10.1016/j.jde.2014.01.024.

Refereed Conference Publications

10. **Zheng Qu**, Peter Richtárik, Martin Takáč and Olivier Fercoq. SDNA : Stochastic Dual Newton Ascent for Empirical Risk Minimization, *ICML*, 2016.
11. Dominik Csiba, **Zheng Qu** and Peter Richtárik. Stochastic Dual Coordinate Ascent with Adaptive Probabilities, *ICML*, 2015.
12. **Zheng Qu**, Peter Richtárik and Tong Zhang. Randomized dual coordinate ascent with arbitrary sampling, *NIPS*, 2015.
13. Olivier Fercoq, **Zheng Qu**, Peter Richtárik and Martin Takáč : Fast distributed coordinate descent for non-strongly convex losses, *IEEE International Workshop on Machine Learning for Signal Processing*, 2014.
14. **Zheng Qu** : A max-plus based randomized algorithm for solving a class of HJB PDEs, *to appear in Proc. of Conference on Decision and Control*, 2014.
15. Stephane Gaubert, **Zheng Qu** and Srinivas Sridharan : Bundle-based pruning in the max-plus curse of dimensionality free method, *21st International Symposium on Mathematical Theory of Networks and Systems*, 2014.
16. **Zheng Qu** : Contraction of Riccati flows applied to the convergence analysis of the max-plus curse of dimensionality free method. *In Proc. of European Control Conference*, pp.2226-2231, 2013.
17. Stephane Gaubert, **Zheng Qu** : Markov operators on cones and non-commutative consensus. *In Proc. of European Control Conference*, pp.2693-2700, 2013.
18. Stephane Gaubert, William M. McEneaney and **Zheng Qu** : Curse of dimensionality reduction in max-plus based approximation methods : theoretical estimates and improved pruning algorithms. *In Proc. of Conference on Decision and Control*, pp.1054-1061, 2011. Doi=10.1109/CDC.2011.6161386.

Teaching Experience

2016 (Sep.-Nov.)	The University of Hong Kong Course title "MATH 3603 Probability Theory". Instructor.
2015 (Jan.-Apr.)	The University of Hong Kong Course title "MATH 3901 Operation Research I". Instructor.
2015 (Sep.-Nov.)	The University of Hong Kong Course title "MATH 3603 Probability Theory". Instructor.
2014 (Sep.-Oct.)	University of Edinburgh Course title "Computing for Operational Research and Finance". Instructor.
2014 (Feb.-May)	University of Edinburgh Course title "Optimization Methods in Finance". Teaching Assistant.
2013 and 2012 (Sep.-Nov.)	École Nationale Supérieure de Techniques Avancées Course title "Dynamical Systems". Teaching Assistant.

Talks

Conference Presentations

08/2016	• The fifth International Conference on Continuous Optimization, Tokyo, Japan.
08/2016	• Conference on Applied Mathematics, Hong Kong.
05/2016	• The ninth China-R Conference, Beijing, China.
12/2015	• International Workshops on Singal Processing, Optimization and Compressed Sensing (SPOC), Guangzhou, China.
07/2015	• The 22nd International Symposium on Mathematical Programming, Pittsburgh, USA.
07/2015	• The 32nd International Conference on Machine Learning, Lille, France.
05/2015	• The 3rd Optimization and Big Data Workshop. Edinburgh, UK.
12/2014	• The 53rd Conference on Decision and Control. Los Angeles, USA.
09/2014	• The 4th IMA Conference on Numerical Linear Algebra and Optimisation. Birmingham, UK.
07/2013	• The 12th European Control Conference. Zurich, Switzerland.
07/2013	• SIAM Annual Meeting. San Diego, California, USA.
06/2013	• International Linear Algebra Society 2013 meeting. Providence, USA.
05/2013	• SMAI 2013. Seignosse, France.
11/2011	• The 50th Conference on Decision and Control. Orlando, USA.

Seminars and Workshops

09/2014	• All Hands Meeting on Big Data Optimization. University of Edinburgh.
06/2014	• All Hands Meetings on Big Data Optimization. University of Edinburgh.
02/2014	• All Hands Meetings on Big Data Optimization. University of Edinburgh.
03/2014	• EGRO (Edinburgh Research Group in Optimization) seminar. University of Edinburgh.
02/2013	• PGMO (Program Gaspard Monge pour l'Optimisation et la Recherche Opérationnelle). France.
03/2012	• Seminar Digeo on Optimization. École Polytechnique, France.
11/2011	• The Second Monterey Workshop on Computational Issues in Nonlinear Control. California, USA.

Awards and Grants

2017-2019	RGC Grant "Randomized methods in large-scale optimization"
2014	London Mathematical Society Research Grant-Conference Grant Scheme 1 (4,000 £).
2014	Baidu Visiting Research Grant (40,000 CNY).
2013	Chinese Government Award for Outstanding Self-Financed Students Abroad.

Research Visits

2014 Research visit at the Baidu Big Data Lab (collaboration with Prof Tong Zhang, head of the lab), Baidu Inc, Beijing, China, July 1 - August 30.

Other Scientific Activities

Reviewer for :

1. Mathematical Programming, Series A
2. Journal of Machine Learning Research
3. Linear Algebra and Applications
4. IEEE Transactions on Automatic Control
5. European Conference on Control
6. Conference on Decision and Control

Co-organizer of

1. 2016 Conference on Applied Mathematics, Hong Kong, August 2016.
2. Invited session at the International Symposium on Mathematical Programming (ISMP). Pittsburgh, USA, July 2015.
3. The 3rd Edinburgh "Optimization and Big Data" workshop. May 2015.
4. All Hands Meeting on Big Data Optimization (weekly innovative, interactive and interdisciplinary research seminar). University of Edinburgh.
5. Invited session : "First-order methods in large-scale optimization" in the 4th IMA Conference on Numerical Linear Algebra and Optimisation. Birmingham, UK, September 2014.