VITA – JIANFENG ZHANG

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Professional Experience

Professor	U. of Southern California	11/2012 –
Associate Professor	U. of Southern California	10/2007 – 11/2012
Assistant Professor	U. of Southern California	8/2003 – 10/2007
Visiting Assistant Professor	University of Minnesota	8/2001 – 8/2003

Education

Ph.D.	in Mathematics	Purdue University	8/2001
M.S.	in Computational Finance	Purdue University	5/2001
B.S.	in Mathematics	Fudan University	7/1995

Research Interests

- Stochastic Analysis
- Backward Stochastic Differential Equations
- Stochastic Controls and Games
- Stochastic Numerics
- Mathematical Finance

Publications

Books:

- J. Cvitanic and J. Zhang, *Contract Theory in Continuous Time Models*, Springer Finance. Springer, Heidelberg, 2012.
- J. Zhang, *Backward Stochastic Differential Equations – from linear to fully nonlinear theory*, Springer, New York, 2017.

Published papers:

1. J. Ma, P. Protter, and J. Zhang, *Explicit form and path regularity of martingale representations*, Levy Processes - Theory and Applications, O.E.Barndorff-Nielsen, T. Mikosch and S.I. Resnick (Eds.), Birkhauser Boston, 337-360, (2001).

2. J. Ma and J. Zhang, *Path regularity of solutions to backward stochastic differential equations*, Probability Theory and Related Fields, **122** (2002), 163-190.
3. J. Ma and J. Zhang, *Representation theorems for backward stochastic differential equations*, Annals of Applied Probability, **12** (4) (2002), 1390-1418.
4. J. Cvitanic, J. Ma, and J. Zhang, *Efficient computation of Δ-hedges for options with discontinuous payoffs*, Mathematical Finance, **13** (1) (2003), 135-151.
5. J. Zhang, *A numerical scheme for backward stochastic differential equations*, Annals of Applied Probability, **14** (1) (2004), 459-488.
6. J. Ma and J. Zhang, *Representations and regularities for solutions to backward stochastic differential equations with reflections*, Stochastic Processes and Their Applications, **115** (4) (2005), 539-569.
7. J. Zhang, *Representation of solutions to backward stochastic differential equations associated with a degenerate forward stochastic differential equation*, Annals of Applied Probability, **15** (3) (2005), 1798-1831.
8. J. Cvitanic and J. Zhang, *The steepest descent method for forward-backward stochastic differential equations*, Electronic Journal of Probability, **10** (2005), 1468-1495.
9. J. Zhang, *The wellposedness of forward-backward stochastic differential equations*, Discrete and Continuous Dynamical Systems-series B, **6** (4) (2006), 927-940.
10. J. Zhang, *Rate of convergence of finite-difference approximations for degenerate ordinary differential equations*, Mathematics of Computation, **75** (256) (2006), 1755-1778.
11. J. Cvitanic, X. Wan, and J. Zhang, *Optimal contracts in continuous-time models*, Journal of Applied Mathematics and Stochastic Analysis, Volume 2006 (2006), Article ID 95203.
12. J. Cvitanic and J. Zhang, *Optimal Compensation with Adverse Selection and Dynamic Actions*, Mathematics and Financial Economics, **1** (1) (2007), 21-55.
13. C. Bender and J. Zhang, *Time discretization and Markovian iteration for coupled FBSDEs*, Annals of Applied Probability, **18** (1) (2008), 143-177.
14. J. Cvitanic, X. Wan, and J. Zhang, *Principal agent problems with exit options*, B.E. Journal of Theoretical Economics, 8 (1) (Contributions) (2008), Article 23.
15. J. Ma, J. Zhang, and Z. Zheng, *Weak solutions for forward-backward stochastic differential equations - a martingale problem approach*, Annals of Probability, 36 (6) (2008), 2092-2125.
16. J. Cvitanic, X. Wan, and J. Zhang, *Continuous-time Principal-Agent problems with hidden action and Lump-Sum Payment*, Applied Mathematics and Optimization, 59 (1) (2009), 99-146.
17. S. Hamadene and J. Zhang, *The continuous time nonzero-sum Dynkin game problem and application in game options*, SIAM Journal on Control and Optimization, 48 (5) (2009/10), 3659-3669. .
18. S. Hamadene and J. Zhang, *Switching problem and related system of reflected BSDEs*, Stochastic Processes and their Applications, 120 (4) (2010), 403-426.
19. I. Kharroubi, J. Ma, H. Pham, and J. Zhang, *Backward SDEs with constrained*

jumps and Quasi-Variational Inequalities, Annals of Probability, 38 (2) (2010), 794-840.

20. M. Soner, N. Touzi and J. Zhang, *Martingale Representation Theorem for the G-expectation*, Stochastic Processes and Their Applications, 121 (2) (2011), 265-287.
21. M. Soner, N. Touzi and J. Zhang, *Quasi-sure Stochastic Analysis through Aggregation*, Electronic Journal of Probability, 16 (2011), 1844-1879.
22. J. Ma and J. Zhang, *On weak solutions of FBSDEs*, Probability Theory and Related Fields, 151 (3-4) (2011), 475-507.
23. M. Soner, N. Touzi and J. Zhang, *Wellposedness of Second Order Backward SDEs*, Probability Theory and Related Fields, 153 (2012), 149-190.
24. J. Cvitanic, J. Ma and J. Zhang, *Law of Large Numbers for Self-Exciting Correlated Defaults*, Stochastic Processes and Their Applications, 122 (2012), 2781 - 2810.
25. J. Ma, H. Yin and J. Zhang, *On Non-Markovian Forward Backward SDEs and Backward Stochastic PDEs*, Stochastic Processes and Their Applications, 122 (2012), 3980-4004.
26. M. Soner, N. Touzi and J. Zhang, *Dual formulation of the second order target problems*, Annals of Applied Probability, 23 (2013), 308-347.
27. J. Ma, Q. Song, J. Xu, and J. Zhang, *Optimal Portfolio Selection under Concave Price Impact*, Applied Mathematics and Optimization, 67 (2013), 353-390.
28. T. Pham and J. Zhang, *Some Norm Estimates for Semimartingales*, Electronic Journal of Probability, 18 (2013), 1-25.
29. I. Ekren, C. Keller, N. Touzi and J. Zhang, *On Viscosity Solutions of Path Dependent PDEs*, Annals of Probability, 42 (2014), 204-236.
30. J. Zhang and J. Zhuo, *Monotone Schemes for Fully Nonlinear Parabolic Path Dependent PDEs*, Journal of Financial Engineering, 1 (2014) 1450005 (23 pages); DOI: 10.1142/S2345768614500056.
31. T. Pham and J. Zhang, *Two Person Zero-sum Game in Weak Formulation and Path Dependent Bellman-Isaacs Equation*, SIAM Journal on Control and Optimization, 52 (2014), 2090-2121.
32. Z. Ren, N. Touzi and J. Zhang, *An Overview of Viscosity Solutions of Path-Dependent PDEs*, Stochastic Analysis and Applications 2014, 100 (2014), 397-453.
33. S. Peng, Y. Song and J. Zhang, *A Complete Representation Theorem for G-martingales*, Stochastics, 86 (2014), 609-631.
34. I. Ekren, N. Touzi and J. Zhang , *Optimal Stopping under Nonlinear Expectation*, Stochastic Processes and Their Applications, 124 (2014), 3277-3311.
35. W. Guo, J. Zhang and J. Zhuo, *A Monotone Scheme for High Dimensional Fully Nonlinear PDEs*, Annals of Applied Probability, 25 (2015), 1540-1580.
36. R. Buckdahn, J. Ma and J. Zhang, *Pathwise Taylor Expansions for Random Fields on Multiple Dimensional Paths*, Stochastic Processes and Their Applications, 125 (2015), 2820-2855.

37. J. Ma, Z. Wu, D. Zhang and J. Zhang, *On Wellposedness of Forward-Backward SDEs — A Unified Approach*, Annals of Applied Probability, 25 (2015), 2168-2214.
38. M. Nutz and J. Zhang, *Optimal Stopping under Adverse Nonlinear Expectation and Related Games*, Annals of Applied Probability, 25 (2015), 2503-2534.
39. J. Ma, X. Wang and J. Zhang, *Dynamic Equilibrium Limit Order Book Model and Optimal Execution Problem*, Mathematical Control and Related Fields, 5 (2015), 557-583.
40. C. Keller and J. Zhang, *Pathwise Itô Calculus for Rough Paths and Rough PDEs with Path Dependent Coefficients*, Stochastic Processes and Their Applications, 126 (2016), 735-766.
41. I. Ekren, N. Touzi and J. Zhang , *Viscosity Solutions of Fully Nonlinear Parabolic Path Dependent PDEs: Part I*, Annals of Probability, 44 (2016), 1212-1253.
42. I. Ekren, N. Touzi and J. Zhang , *Viscosity Solutions of Fully Nonlinear Parabolic Path Dependent PDEs: Part II*, Annals of Probability, 44 (2016), 2507-2553.
43. J. Ma, Z. Ren, N. Touzi and J. Zhang, *Large Deviations for Non-Markovian Diffusions and a Path-Dependent Eikonal Equation*, Annales de l'Institut Henri Poincare, 52 (2016), 1196-1216.
44. I. Ekren and J. Zhang, *Pseudo Markovian Viscosity Solutions of Fully Nonlinear Degenerate PPDEs*, Probability, Uncertainty and Quantitative Risk, (2016) 1:6, DOI 10.1186/s41546-016-0010-3.
45. J. Diehl and J. Zhang, *Backward Stochastic Differential Equations with Young Drift*, Probability, Uncertainty and Quantitative Risk, (2017) 2:5 DOI 10.1186/s41546-017 -0016-5.
46. Z. Ren, N. Touzi and J. Zhang, *Comparison of Viscosity Solutions of Fully Nonlinear Degenerate Parabolic Path-dependent PDEs*, SIAM Journal on Mathematical Analysis, 49 (2017), 4093-4116.
47. C. Karnam, J. Ma and J. Zhang, *Dynamic Approaches for Some Time Inconsistent Optimization Problems*, Annals of Applied Probability, 27 (2017), 3435-3477.
48. H. Wang and J. Zhang, *Forward Backward SDEs in Weak Formulation*, Mathematical Control and Related Fields, 8 (2018), 1021-1049.
49. Y. Saporito and J. Zhang, *Stochastic Control with Delayed Information and Related Nonlinear Master Equation*, SIAM Journal on Control and Optimization, 57 (2019), 693-717.
50. F. Viens and J. Zhang, *A Martingale Approach for Fractional Brownian Motions and Related Path Dependent PDEs*, Annals of Applied Probability, 29 (2019), 3489-3540.
51. Z. Ren, N. Touzi and J. Zhang, *Comparison of Viscosity Solutions of Semi-linear Path-Dependent PDEs*, SIAM Journal on Control and Optimization, 58 (2020), 277-302.
52. C. Wu and J. Zhang, *Viscosity Solutions to Parabolic Master Equations and McKean-Vlasov SDEs with Closed-loop Controls*, Annals of Applied Probability, 30 (2020), 936-986.
53. D. Possamai, N. Touzi and J. Zhang, *Zero-sum path-dependent stochastic*

differential games in weak formulation, Annals of Applied Probability, 30 (2020), 1415-1457.

54. R. Buckdahn, C. Keller, J. Ma and J. Zhang, *Fully Nonlinear Stochastic and Rough PDEs: Classical and Viscosity Solutions*, Probability, Uncertainty and Quantitative Risk, (2020) 5:7, DOI: 10.1186/s41546-020-00049-8.
55. J. Yong and J. Zhang, *Non-Equivalence of Stochastic Optimal Control Problems with Open and Closed Loop Controls*, Systems & Control Letters, 153 (2021), 104948.
56. J. Ma, T.-K. L. Wong and J. Zhang, *Time-consistent conditional expectation under probability distortion*, Mathematics of Operations Research, 46 (2021), 1149-1180.
57. Z. Feinstein, B. Rudloff, and J. Zhang, *Dynamic Set Values for Nonzero Sum Games with Multiple Equilibriums*, Mathematics of Operations Research, 47 (2022), 616-642.
58. H. Wang, J. Yong, and J. Zhang, *Path Dependent Feynman-Kac Formula for Forward Backward Stochastic Volterra Integral Equations*, Annales de l'Institut Henri Poincare, 58 (2022), 603-638.
59. C. Mou and J. Zhang, *Mean Field Games of Controls: Propagation of Monotonicities,* Probability, Uncertainty and Quantitative Risk, 7 (2022), no. 3, 247-274.
60. W. Gangbo, A. Meszaros, C. Mou, and J. Zhang, *Mean Field Games Master Equations with Non-separable Hamiltonians and Displacement Monotonicity*, Annals of Probability, 50 (2022), 2178-2217.
61. M. Talbi, N. Touzi, and J. Zhang, *Viscosity solutions for obstacle problems on Wasserstein space*, SIAM Journal of Control and Optimization, 61 (2023), 1712-1736.
62. M. Talbi, N. Touzi, and J. Zhang, *Dynamic Programming Equation for the Mean Field Optimal Stopping Problem*, SIAM Journal of Control and Optimization, 61 (2023), 2140-2164.
63. Q. Feng and J. Zhang, *Cubature Method for Stochastic Volterra Integral Equations*, SIAM Journal of Financial Mathematics, 14 (2023), 959-1003.
64. J. Zhang, *Is a sophisticated agent always a wise one?*, SIAM Journal of Financial Mathematics, Short Communication, 14(2023), SC42-SC48.
65. C. Mou and J. Zhang, *Minimal Solutions of Master Equations for Extended Mean Field Games*, Journal des Mathematiques Pures et Appliquees, 184(2024), 190-217.
66. M. Talbi, N. Touzi, and J. Zhang, *From finite population optimal stopping to mean field optimal stopping*, Annals of Applied Probability, 34(2024), 4237-4267.
67. C. Mou and J. Zhang, *Wellposedness of Second Order Master Equations for Mean Field Games with Nonsmooth Data*, Memoirs of the AMS, 302 (2024), no. 1515.
68. M. Iseri and J. Zhang, *Set Values for Mean Field Games*, Transactions of the AMS, 377 (2024), 7117-7174.
69. C. Mou and J. Zhang, *Mean Field Game Master Equations with Anti-monotonicity Conditions*, Journal of the European Mathematical Society, accepted, arXiv:2201.10762.
70. J. Zhang and Z. Zhu, *A Dynamic Principal Agent Problem with One-sided Commitment,* Mathematics of Operations Research, accepted, arXiv:2208.06473.

Preprints:

71. A. Lazrak and J. Zhang, *Unlocking Democratic Efficiency: How Coordinated*

Outcome-Contingent Promises Shape Decisions, preprint, arXiv:2304.08008.

72. M. Iseri and J. Zhang, *Set Valued Hamilton-Jacobi-Bellman Equations*, preprint, arXiv:2311.05727.
73. J. Zhou, N. Touzi, and J. Zhang, *Viscosity Solutions for HJB Equations on the Process Space: Application to Mean Field Control with Common Noise*, preprint, arXiv:2401.04920.
74. J. Zhang, *Instability and Efficiency of Non-cooperative Games*, preprint, arXiv:2405.17196.
75. J. Ma, G. Wang, and J. Zhang, *On Convergence Analysis of Policy Iteration Algorithms for Entropy-Regularized Stochastic Control Problems*, preprint, arXiv:2406.10959.
76. B. Qiao and J. Zhang, *Set Values of Dynamic Nonzero Sum Games and Set Valued Hamiltonians*, preprint, arXiv:2408.09047.
77. M. Soner, V. Tissot-Daguette, and J. Zhang, *Controlled Occupied Processes and Viscosity Solutions*, preprint, arXiv:2411.12080.
78. C. Mou, J. Zhang and J. Zhou, *Second-order monotonicity conditions and mean field games with volatility control*, preprint, arXiv:2503.10097.

Other publications:

1. J. Zhang, *Forward Backward SDEs*, Encyclopedia of Quantitative Finance, Rama Cont (Ed), Wiley, (2010), 7 pages.
2. J. Zhang, *The Wellposedness of FBSDEs (II)*, arXiv:1708.05785.
3. C. Wu and J. Zhang, *An Elementary Proof for the Structure of Wasserstein Derivatives*, arXiv:1705.08046.
4. S. Yao and J. Zhang, *Preface: a tribute to Professor Jin Ma on his 65th birthday*, *Numer. Algebra Control Optim.* 13 (2023), no. 3-4, i-ii.

Presentations

Invited conference talks

1. "*Representations and regularities for solutions to backward stochastic differential equations with reflections*", The 3rd Colloquium on *Backward Stochastic Differential Equations, Finance and Applications*, (Satellite Conference of ICM 2002), Shandong University (China), August 2002.
2. "*Representation of Solutions to BSDEs Associated with a Degenerate FSDE*", AMS Meeting, Special Session on "Stochastic Analysis with Applications", Indiana University, April 2003.
3. "*On the sharp rate of finite-difference approximations for degenerate differential equations*", Purdue Mini-conference on Financial Mathematics, Purdue University, April 2003.
4. "*L^2-modulus Regularity and Numerical Methods for BSDEs*", Southern California

Probability Symposium, University of California in Los Angeles, November 2003.

5. "*L^2-modulus Regularity and Numerical Methods for BSDEs*", Workshop on Numerical probabilistic methods for high-dimensional problems in finance, American Institute of Mathematics, December 2003.
6. "*The Steepest Descent Method for FBSDEs*", Workshop on Monte-Carlo Methods, Isaac Newton Institute (UK), May 2005.
7. "*The Wellposedness of FBSDEs*", Fourth Colloquium on Backward Stochastic Differential Equations and Their Applications, Fudan University (China), May 2005.
8. "*Weak Solutions for Forward-Backward SDEs — A Martingale Problem Approach*", Conference on Random Media and Stochastic Partial Differential Equations, University of Southern California, June 2005.
9. "*Continuous-time Principal-Agent problems with hidden actions*", 30th Conference on Stochastic Processes and Their Applications, University of California at Santa Barbara, June 2005.
10. "*The Steepest Descent Method for FBSDEs*", Conference on Stochastic Control and Numerics, University of Wisconsin-Milwaukee, September 2005.
11. "*The Wellposedness of FBSDEs*", Conference on Martingales, Stochastic Analysis, and Potential Theory, University of Florida, November 2005.
12. "*Continuous Time Principal Agent Problems with Moral Hazard and/or Adverse Selection*", Workshop on Optimization problems in financial economics, Banff International Research Station, Alberta (Canada), May 2006.
13. "*Optimal contracting with random time of payment and outside options*", joint Stanford-Tsukuba/WCQF workshop on quantitative finance, Stanford University, March 2007.
14. "*Switching problems and related systems of RBSDEs*", Fifth colloquium on BSDEs and finance, Universite du Maine (France), June 2008.
15. "*Impulse Control and Optimal Portfolio Selection with General Transaction Cost*", Chicago-Paris Workshop in Financial Mathematics, Chateau La Princesse (France), June 2008.
16. "*Continuous Time Principal-Agent Problems*", 7th World Congress in Probability and Statistics, National University of Singapore (Singapore), July 2008.
17. "*Dual Formulation of Second Order Target Problems*", International Conference on Mathematical Control Theory, Chinese Academy of Science, Beijing (China), May 2009.
18. "*Dual Formulation of Second Order Target Problems*", Workshop on Mathematical Finance, Sabanci University, Istanbul (Turkey), May 2009.
19. "*Monte-Carlo Methods for High Dimensional BSDEs and Associated Nonlinear Parabolic PDEs*", Workshop on Computational Finance, Kyoto University, Kyoto (Japan), August 2009.
20. "*Law of Large Numbers for Self-exciting Correlated Defaults*", Workshop on Mathematical Finance, Kansai Seminar House, Kyoto (Japan), August 2009.
21. "*Martingale Representation for the G-expectation*", New Directions Short Course: New Mathematical Models in Economics and Finance, IMA, June 2010.
22. "*Monte Carlo Methods for High Dimensional Backward SDEs and Nonlinear Parabolic PDEs*", Stochastic Processes and Their Applications, Osaka (Japan), September 2010.

23. "*Second Order Backward SDEs*", Workshop on Mathematical Finance and Related Issues, Kyoto Research Park, Kyoto (Japan), September 2010.
24. "*A unified approach to wellposedness of non-Markovian FBSDEs*", New advances in BSDEs for financial engineering applications, Tamerza (Tunisia), October 2010.
25. "*Second Order Backward SDEs*", Mathematical Finance and Partial Differential Equations 2010, Rutgers University, December 2010.
26. "*Some Estimates for Semimartingales under Linear and Nonlinear Expectations*", Workshop on Nonlinear Expectation and its Applications in Financial Economics, Peking University (China), July 2011.
27. "*Second Order Backward SDEs and Applications*", International Workshop on Finance 2011, Tokyo Metropolitan University, Kyoto (Japan), August 2011.
28. "*Viscosity Solutions of Fully Nonlinear Path Dependent PDEs*", 3rd Linnaeus University Workshop in Stochastic Analysis and its Applications, Linnaeus University, Vaxjo (Sweden), May 2012.
29. "*Viscosity Solutions of Path Dependent PDEs*", The 5th WCMF Conference, Stanford University, May 2013.
30. "*Two Person Zero Sum Stochastic Differential Game under Weak Formulation*", Workshop on Knightian Uncertainty and BSDE, National University of Singapore, June 2013.
31. "*A Monotone Scheme for High Dimensional Fully Nonlinear Parabolic PDEs*", IMS Workshop on Finance - Probability and Statistics, National University of Singapore,June 2013.
32. "*Viscosity Solutions of Path Dependent PDEs*", 2nd PRIMA Probability Session, Shanghai Jiaotong University (China), June 2013.
33. "*Viscosity Solutions of Path Dependent PDEs*", Conference on Random Dynamical Systems, Nakai University (China), July 2013.
34. "*Viscosity Solutions of Path Dependent PDEs*", A Conference in Memory of Professor Xunjing Li, Fudan University (China), July 2013.
35. "*Monotone Schemes for Path Dependent PDEs*", Labex Louis Bachelier - SIAM-SMAI Conference on Financial Mathematics: Advanced Modeling and Numerical Methods, Paris Diderot, June 2014.
36. "*Viscosity Solutions of Path Dependent PDEs*", 7th International Symposium on BSDEs, Weihai, June 2014.
37. "*Some Thoughts about Time Inconsistent Problems*", Broad Perspectives and New Directions in Financial Mathematics, IPAM, Los Angeles, April 2015.
38. "*Some Thoughts about Path Dependent PDEs — Forward Versus Backward Problems*", Workshop on Probability, Uncertainty, and Quantitative Risk, Shandong University at Weihai (China), June 2015.
39. "*Some Thoughts about Path Dependent PDEs — Forward Versus Backward Problems*", IMS-China 2015, Kunming, July 2015.
40. "*Dynamic Approaches for Some Time Inconsistent Problems*", International Conference on Mathematical Control Theory — In Memory of Professor Xunjing Li for His 80th Birthday, Chengdu (China), July 2015.

41. "*Dynamic Approaches for Some Time Inconsistent Problems*", ICIAM 2015 Minisymposium on Stochastic control perspectives in mathematical finance, Beijing (China), August 2015.
42. "*Monotone Schemes for Path Dependent PDEs*", ICIAM 2015 Minisymposium on Numerical Analysis for FBSDEs and Related Problems, Beijing (China), August 2015.
43. "*Pathwise Ito Calculus for Rough Paths and Fully Nonlinear Stochastic PDEs*", ICIAM 2015 Minisymposium on Functional Ito calculus and Path-dependent PDEs, Beijing (China), August 2015.
44. "*Dynamic Approaches for Some Time Inconsistent Problems*", AMS Fall Western Sectional Meeting, Fullerton, October 2015.
45. "*Viscosity Solutions of Path Dependent PDEs*", AMS Fall Western Sectional Meeting, Fullerton, October 2015.
46. "*Dynamic Approaches for Some Time Inconsistent Problems*", The 7th WCMF Conference, Austin, October 2015.
47. "*Dynamic Approaches for Some Time Inconsistent Problems*", AMS Special Session on Financial Mathematics, Seattle, January 2016.
48. "*Fully nonlinear SPDEs and RPDEs: classical and viscosity solutions*", Workshop on Rough Paths, Regularity Structures and Related Topics, Oberwalfach, May 2016.
49. "*Stochastic Calculus in Weak Formulation*", SIAM Conference on Financial Mathematics & Engineering, Austin, November 2016.
50. "*Dynamic Utility for Some Time Inconsistent Problems*", SIAM Conference on Financial Mathematics & Engineering, Austin, November 2016.
51. "*A martingale approach for fractional Brownian motions*", The 8th WCMF, University of Washington, Seattle, March 2017.
52. "*A martingale approach for fractional Brownian motions*", Mathematical Finance, Probability, and PDE Conference, Rutgers University, May 2017.
53. "*Some New Types of Path Dependent PDEs* ", Workshop on BSDEs and SPDEs, University of Edinburgh (UK), July 2017.
54. "*Some New Thoughts about Time Inconsistency*", IPAM Reunion of "Broad Perspectives and New Directions in Financial Mathematics", Lake Arrowhead, December 2017.
55. "*Dynamic Approaches for Some Time Inconsistent Problems*", Workshop on "Dynamic Multivariate Programming", Vienna University of Economics and Business, March 2018.
56. "*Viscosity Solutions to Parabolic Master Equations*", International Symposium on Mathematical Control Theory – Dedicated to Jiongmin Yong on the occasion of his 60th birthday, Fudan University, June 2018.
57. "*Viscosity Solutions to Parabolic Master Equations*", Workshop on Finance and Economics Applications", IMA, June 2018.
58. "*Some Thoughts about Time Inconsistent Problems*", A Symposium on Optimal Stopping (in memory of Larry Shepp), Rice University, June 2018.
59. "*A Martingale Approach for Fractional Brownian Motions and Related Path Dependent PDEs*", Workshop on Stochastic Analysis and Related Topics, University of Hong Kong, July 2018.
60. "*Viscosity Solutions to Parabolic Master Equations*", The 5th Conference in Memory of Professor Xunjing Li, Northeast Normal University, July 2018.

61. "*Viscosity Solutions to Parabolic Master Equations*", The 10th World Congress of the Bachelier Finance Society, Trinity College Dublin, July 2018.
62. "*Dynamic Programming Principle for Nonzero Sum Games*", Mathematics in the City Beautiful: PDEs, SDEs, Control Theory, and Applications to Finance and Life Sciences, University of Central Florida, December 2018.
63. "*Weak Solutions of Mean Field Game Master Equations* ", International Workshop on Probability, Uncertainty, and Quantitative Risk, Shandong University at Weihai (China), July 2019.
64. "*Weak Solutions of Mean Field Game Master Equations* ", Stochastic Control in Finance, National University of Singapore, July 2019.
65. "*Set Values for Nonzero Sum Games with Multiple Equilibriums* ", Workshop on "Dynamic Multivariate Programming II", Vienna University of Economics and Business, August 2019.
66. "*Set Values for Nonzero Sum Games with Multiple Equilibriums* ", MAFIA – Mathematical Finance and Analysis Symposium in honor of Philip E. Protter, Columbia University, September 2019.
67. "*Weak Solutions of Mean Field Game Master Equations* ", SIAM Conference on Analysis of Partial Differential Equations, La Quinta, December 2019.
68. "*Set Values for Mean Field Games*", Mean Field Games and Applications, IPAM, May 2020 (virtual conference).
69. "*HJB Equations in Wasserstein Space and Viscosity Solutions*", Hamilton-Jacobi PDEs Culminating Workshop, June 2020 (virtual conference).
70. "*Mean Field Games Master Equations with Non-separable Hamiltonians and Displacement Monotonicity*", AMS Southeastern Sectional Meeting, Special Session on "Stochastic Controls and Related Topics", March 2021 (virtual conference).
71. "*Mean Field Games Master Equations with Non-separable Hamiltonians and Displacement Monotonicity*", Financial Mathematics/ Engineering Seminar Series, Hong Kong Consortium of Quantitative Finance, April 2021 (virtual)
72. "*Mean Field Game Master Equations with Monotonicity and Anti-monotonicity Conditions in Displacement Sense*", BFS One World Seminar, June 2021 (virtual)
73. "*Mean Field Game Master Equations with Monotonicity and Anti-monotonicity Conditions in Displacement Sense*", Workshop on "Advances in Stochastic Analysis for Handling Risks in Finance and Insurance", CIRM, September, 2021 (virtual participation).
74. "*Mean Field Game Master Equations with Monotonicity and Anti-monotonicity Conditions in Displacement Sense*", North-East and Midlands Stochastic Analysis Seminar (UK), September, 2021 (virtual conference).
75. "*Set Values of Non-zero Sum Games and Mean Field Games*", DKU-NUSRI Joint Workshop on Pure & Applied Mathematics (China), January, 2022 (virtual conference).
76. "*Set Values of Non-zero Sum Games and Mean Field Games*", Hamilton-Jacobi PDEs Reunion Conference I, IPAM, January, 2022 (virtual participation).
77. "*Set Values of Non-zero Sum Games and Mean Field Games*", UCL-Osaka International Online Conference on the Mathematics for Risk and Decisions, March, 2022 (virtual).
78. "*Propagation of Monotonicity for Mean Field Game Master Equations*", International Seminar on SDEs and Related Topics, March, 2022 (virtual).

79. "*Set Values of Non-zero Sum Games and Mean Field Games*", Fifth International Conference on Set Optimization with Applications to Economics, Finance, Statistics and Game Theory, Ankara (Turkey), June, 2022 (virtual participation).
80. "*Set Valued HJB Equations*", 9th Colloquium on BSDEs and Mean Field Systems, Annecy (France), June, 2022 (virtual participation).
81. "*Set Valued HJB Equations*", Advances in Stochastic Control and Optimal Stopping with Applications in Economics and Finance, Marseille (France), September, 2022 (virtual participation).
82. "*Master Equations for Extended MFG and MFG with a Major Player*", Mean Field Games and Applications Workshop, Lagrange Mathematics and Computation Research Center, Paris (France), December, 2022
83. "*Set Valued HJB Equations*", The Hong Kong – Singapore Joint Seminar Series in Financial Mathematics/Engineering, February, 2023 (virtual)
84. "*Viscosity Solutions for Path Dependent Mean Field Control Problems*", Applications of Stochastic Control to Finance and Economics, Banff (Canada), May, 2023
85. "*Democratic Policy Decisions with Decentralized Promises Contingent on Vote Outcome*", Chicago Conference on Stochastic Analysis and Financial Mathematics, Chicago, May, 2023
86. "*Viscosity Solutions for Path Dependent Mean Field Control Problems*", CSIAM Annual Workshop 2023, Yinchuan (China), August, 2023.
87. "*Set Values of Nonzero Sum Games*", Recent Advances in Stochastic Control, Machine Learning and Quantitative Finance, Shanghai Jiaotong University (China), April, 2024.
88. "*Set Values and Efficiency of Nonzero Sum Games*", 30th birthday of the Laboratoire Manceau de Mathematiques : Probability - Statistitics- Risk, Le Mans (France), May, 2024 .
89. "*Set Values of Nonzero Sum Games*", Equilibrium Summer School, Rutgers University, July, 2024 .

Invited short courses

1. " *Monte-Carlo Methods for High Dimensional BSDEs*", Fudan University (China), May-June 2009
2. "*Second Order Backward SDEs*", Bachelier course, Universite Paris 6 (France), November-December 2009
3. "*Second Order Backward SDEs*", Sino-French Summer Institute 2011, Beijing (China), June 2011
4. "*Monte-Carlo Methods for High Dimensional BSDEs*", Shandong University (China), August 2011
5. "*Viscosity Solutions of Path Dependent PDEs*", European FP7 Marie Curie ITN Spring School, Roscoff (France), March 2012
6. "*Viscosity Solutions of Path Dependent PDEs*", IMS tutorial lectures, National University of Singapore, June 2013
7. "*Viscosity Solutions of Path Dependent PDEs*", LIASFMA Summer school, Chinese Academy of Science (China), July 2013
8. "*Viscosity Solutions of Path Dependent PDEs*", Fudan University (China), July 2014
9. "*Stochastic Calculus in Weak Formulation*", Summer school on "Financial Mathematics

and Financial Engineering", Weihai (China), July 2016.

10. "*Backward SDEs and Recent Extensions*", Summer school on "Financial Mathematics and Financial Engineering", Qingdao (China), July 2023.
11. "*Introduction to Mean Field Controls and Games*", Shandong University (China), February 2024.
12. "*Introduction to Mean Field Controls and Games*", Equilibrium Summer School, Rutgers University, July, 2024 .

Grants

- NSF grant DMS-0403575, 8/2004-7/2007, Co-PI (PI: Jaksa Cvitanic)
- NSF grant DMS-0631366, 1/2007-12/2009, PI
- NSF grant, DMS-1008873, 9/2010-8/2013, PI
- NSF conference grant DMS-1059909, 2/2011-2/2012, Co-PI (PI: Jin Ma)
- NSF grant, DMS-1413717, 9/2014-8/2018, PI
- NSF grant, DMS-1908665, 7/2019-6/2023, PI
- NSF grant, DMS-2205972, 7/2022-6/2025, PI

Editorial board

- Associate Editor of *Stochastic Processes and Their Applications*, 2014-present
- Associate Editor of *Applied Mathematics and Optimization*, 2015-present
- Associate Editor of *Probability, Uncertainty and Quantitative Risk*, 2016-present
- Associate Editor of *Frontiers of Mathematical Finance*, 2021-present
- Associate Editor of *Stochastics and Dynamics*, 2021-present
- Associate Editor of *Numerical Algebra, Control and Optimization*, 2022-present
- Associate Editor of *Mathematical Control and Related Fields*, 2010-2022
- Associate Editor of *The Annals of Applied Probability*, 2013-2018
- Associate Editor of *Statistics and Probability Letters*, 2014-2018
- Associate Editor of *SIAM Journal on Financial Mathematics*, 2017-2022
- Guest Editor of *Numerical Algebra, Control and Optimization*, 13 (2023), No. 3&4 Special issue dedicated to Professor Jin Ma for his 65th birthday

Supervision

Ph.D. Students

1. Xuhu Wan (Ph.D 2005, co-advised with Jaksa Cvitanic)
2. Coskun Cetin (Ph.D 2005, co-advised with Jaksa Cvitanic)
3. Jose Villalobos (Ph.D 2007)

4. Yuegang Zhou (Ph.D 2008)
5. Xinyang Wang (Ph.D 2011, co-advised with Jin Ma)
6. Jie Du (Ph.D. 2012)
7. Triet Pham (Ph.D. 2013)
8. Jia Zhuo (Ph.D. 2014)
9. Ibrahim Ekren (Ph.D. 2014)
10. Christian Keller (Ph.D. 2015)
11. Chandrasekhar Karnam (Ph.D. 2016, co-advised with Jin Ma)
12. Cong Wu (Ph.D. 2017)
13. Jie Ruan (Ph.D. 2020)
14. Pengbin Feng(PhD 2021, co-advised with Jin Ma)
15. Zimu Zhu (PhD 2021)
16. Austin Pollok (PhD 2022)
17. Melih Iseri (PhD 2023)
18. Bixing Qiao (current)
19. Gaozhan Wang (current, co-advised with Jin Ma)
20. Zihao Gu (current)

Long term visiting PhD students

1. Jing Xu (9/2007-8/2008), from Renmin University of China, China
2. Detao Zhang (9/2009-8/2010), from Shandong University, China
3. Guo Liu (9/2010-8/2012), from Shanghai University of Finance and Economics, China
4. Wenjie Guo (9/2011-8/2012), from Fudan University, China
5. Haiyang Wang (8/2014-7/2015), from Shandong University, China
6. Zimu Zhu (8/2014-7/2015), from Fudan University, China
7. Mehdi Talbi (10/2018-7/2019), from Ecole Polytechnique, France
8. Valentin Tissot-Daguette (9/2023-5/2024), from Princeton University

Mentor of Non-Teure-Track Assistant Professors

1. Qingshuo Song (8/2005-8/2008)
2. Hong Yin (8/2008-8/2011)
3. Leonard Wong (8/2016-8/2018)
4. Qi Feng (8/2018 - 8/2021)
5. Zhaoyu Zhang (8/2020 - 8/2023)
6. Weixuan Xia (8/2023-)