

数据分析与优化计算团队

1. 团队简介

数据分析与优化计算科研团队主要研究计算生物学和复杂网络领域具有的数据与性态分析以及数值计算等方面的课题，研究内容包括系统生物学、医学数据与统计分析和最优化理论及其应用；信号与图像处理；复杂网络性态、同步分析与控制；最优化理论及算法研究；投资组合选择与互补问题；数值代数及其应用，张量计算与张量分析；最优化方法及其应用；随机系统的动力学与控制；随机最优化；大数据、数学建模和机器学习等。

目前，团队主要成员有 10 人，其中高级职称 4 人，中级职称 6 人，博士学位获得者 9 人。团队中有 5 人入选广东工业大学“青年百人”人才计划。团队在《Applied Mathematical Modelling》《Applied Mathematics and Computation》《Advances in Difference Equations》《International Journal of Robust and Nonlinear Control》《Nonlinear Dynamics》《Communications in Nonlinear Science and Numerical Simulation》《Optimization》《Numerical Algorithms》《Journal of Computational and Applied Mathematics》等期刊上发表研究论文 100 余篇。主持国家自然科学基金 5 项，广东省自然科学基金及市科技计划以上项目共计 15 项。

2. 团队负责人简介

王振友，教授，硕士生导师。2015 年 12 月毕业于中山大学计算数学专业，获得博士学位。主要从事系统生物学、医学数据与统计分析和最优化理论及其应用等方向的研究，公开发表学术论文 30 多篇。主持国家自然科学基金项目 1 项，主持中央引导项目 1 项，主持省部级科研项目 6 项；参加国家自然科学基金项目 3 项。主持省部级以上教改项目 8 项。现担任广东省数学教学指导委员会副秘书长、粤港澳应用数学中心副秘书长、广东省工业与应用数学学会常务理事、广东省现场统计学会常务理事、广州市工业与应用数学学会副理事长等。

3. 团队主要成员

姓名	学位	专业技术职务	研究方向
王振友	博士	教授	系统生物学、医学数据与统计分析和最优化理论及其应用
王福龙	博士	教授	信号图像处理
张丽丽	博士	副教授	复杂网络性态、同步分析与控制
刘玉兰	博士	副教授	最优化理论及算法研究
吴先萍	博士	讲师	投资组合选择与互补问题
刘冬冬	博士	讲师	数值代数及其应用，张量计算与张量分析
常静雅	博士	讲师	最优化方法及其应用
杨勇歌	博士	讲师	随机系统的动力学与控制
卢相刚	博士	讲师	随机最优化
徐圣兵	硕士	讲师	大数据、数学建模、机器学习

4. 团队承担的科研项目（仅列主持的部分项目）

编号	项目名称	项目类别	执行期限	主持人
1	固态肿瘤细胞的化学成分与生长特性对扰动（治疗）的反馈机制规律	国家自然科学基金青年基金	2014.01-2017.12	王振友
2	具有关键节点的复杂动态相似网络聚类广义同步控制研究	国家自然科学基金青年基金	2017.01-2019.12	张丽丽
3	数据聚类问题中的一类张量优化方法研究	国家自然科学基金青年基金	2020.01-2022.12	常静雅
4	具有记忆特征的振动能量采集系统随机动力学研究	国家自然科学基金青年基金	2020.01 - 2022.12	杨勇歌
5	受控切换扩散过程最优化控制问题研究	国家自然科学基金青年基金	2019.01-2021.12	卢相刚
6	动态投资组合均值-方差模型的数值分析	中国博士后科学基金	2016-2018	吴先萍
7	超大规模智能信息数据的复杂网络分析及张量计算	广东省基础与应用基础研究基金（中央引导项目-粤港澳应用数学中心项目）	2020.01-2021.12	王振友
8	具有簇头的多簇群复杂动态网络簇同步控制	广东省自然科学基金	2016.06-2019.06	张丽丽
9	复杂动态网络节点群体行为与拓扑结构相互作用机理分析与控制	广东省基础与应用基础研究基金面上项目	2019.10-2022.09	张丽丽
10	低秩复合优化问题的理论及算法研究	广东省自然科学基金面上项目	2019.10-2022.10	刘玉兰
11	基于投资组合均值-方差模型的线性互	广东省自然科学基金	2017-2020	吴先萍

	补问题的理论与数值分析	基金		
12	肿瘤转移过程中细胞微循环变化过程的动态模型研究	广州市科技计划	2017. 04- 2019. 04	王振友
13	双层规划的理论、算法研究及其在机器学习中的应用	计算机软件新技术国家重点实验室(南京大学)开放课题	2020. 5- 2021. 5	刘玉兰
14	矩阵低秩稀疏分解的优化模型及算法研究	浙江大学CAD&CG国家重点实验室开放课题	2018. 01- 2018. 12	刘玉兰
15	基于实测数据的海上搜救优化决策模型研究	广东省科技计划项目	2015. 9. - 2018. 12	徐圣兵
16	依托存量资源的“互联网+美丽乡村”数字信息化平台建设咨询	广东省农村科技特派员精准扶贫项目	2019. 6- 2020. 9	徐圣兵
17	数据挖掘课程资源与教学改革建设	教育部产学研合作协同育人项目	2018. 12- 2020. 5	徐圣兵
18	张量优化问题的计算与应用	广东工业大学青年百人科研启动项目	2019. 04- 2024. 04	常静雅

5. 代表性科研论文（仅列第一作者的部分论文）

- (1) **Wang, Zhenyou**; Xiao, Cuntao; Lin, Xianwei Single Machine Total Absolute Differences Penalties Minimization Scheduling with a Deteriorating and Resource-Dependent Maintenance Activity. COMPUTER JOURNAL. 2018,61(1):105-110.
- (2) **Wang, Zhenyou**; Wei, Cai-Min; Sun, Linhui. Solution algorithms for the number of tardy jobs minimisation scheduling with a time-dependent learning effect. INTERNATIONAL JOURNAL OF PRODUCTION RESEARCH. 2017,55(11): 3141-3148.
- (3) **Wang, Zhenyou**; Wei, Cai-Min; Wu, Yu-Bin. Single Machine Two-Agent Scheduling with Deteriorating Jobs. ASIA-PACIFIC JOURNAL OF OPERATIONAL RESEARCH. 2016,33(5):1650034.
- (4) **Wang, Zhenyou**; Wei, Cai-Min; Lu, Yuan-Yuan. Permutation Flow Shop Problem with Shortening Job Processing Times. ASIA-PACIFIC JOURNAL OF OPERATIONAL RESEARCH. 2016, 33(4):1650032.
- (5) **Wang, Zhenyou**; Zhu, Jiang; Xue, Yanmei. Cell recognition based on topological sparse coding for microscopy imaging of focused ultrasound treatment. BMC MEDICAL IMAGING 2015,15: 46.
- (6) **Wang, Zhenyou**; Huang, Xueling; Song, Changxiu. Quantitative Analysis of Dynamic $^{13}\text{N-NH}_3$ PET Images in Brain Tumors. AEBMR-Advances in Economics Business and Management Research. 2015, 8: 368-373.
- (7) **Wang, Zhenyou**; Song, Changxiu. Periodic solutions for the p-Laplacian neutral functional differential system: ADVANCES IN DIFFERENCE EQUATIONS. 2013: 367.

- (8) **Lili Zhang**, Yinhe Wang, Qingyun Wang, Shouhong Qiao, Fang Wang. Generalized projective synchronization for networks with one crucial node and different dimensional nodes via a single controller, *Asian Journal of Control*, 2020, 22: 1471-1483.
- (9) **Lili Zhang**, Yinhe Wang, Qingyun Wang, Youfa Lei, Fang Wang. Matrix projective cluster synchronization for arbitrarily coupled networks with different dimensional nodes via nonlinear control, *International Journal of Robust and Nonlinear Control*, 2019, 29(11):3650-3665.
- (10) **Lili Zhang**, Youfa Lei, Yinhe Wang, Xuesong Chen, Matrix projective synchronization for time-varying disturbed networks with uncertain nonlinear structures and different dimensional nodes, *Neurocomputing*, 2018, 311: 11-23.
- (11) **Lili Zhang**, Youfa Lei, Yinhe Wang, Haoguang Chen, Generalized outer synchronization between non-dissipatively coupled complex networks with different-dimensional nodes, *Applied Mathematical Modelling*, 2018, 55: 248-261.
- (12) **Lili Zhang**, Youfa Lei, Yinhe Wang, Baoying Chen, Stabilization of time-varying and disturbed complex dynamical networks with different-dimensional nodes and uncertain nonlinearities, *Asian Journal of Control*, 2017, 19(6): 2143-2154.
- (13) **Lili Zhang**, Yinhe Wang, Yuanyuan Huang, Synchronization for non-dissipatively coupled time-varying complex dynamical networks with delayed coupling nodes, *Nonlinear Dynamics*, 2015, 82(3): 1581-1593.
- (14) **Lili Zhang**, Yinhe Wang, Yuanyuan Huang, Xuesong Chen, Delay-dependent synchronization for non-diffusively coupled time-varying complex dynamical networks, *Applied Mathematics and Computation*, 2015, 259: 510-522.
- (15) **Lili Zhang**, Yinhe Wang, Qingyun Wang, Synchronization for time-varying complex dynamical networks with different-dimensional nodes and non-dissipative coupling, *Communications in Nonlinear Science and Numerical Simulation*, 2015, 24(1-3): 64-74.
- (16) **Lili Zhang**, Yinhe Wang, Qinruo Wang, Adaptive fuzzy synchronization for uncertain chaotic systems with different dimensions and disturbances, *International Journal of Fuzzy Systems*, 2015, 17(2): 309-320.
- (17) **Lili Zhang**, Yinhe Wang, Qinruo Wang, Siying Zhang, Synchronization for time-delayed coupling complex dynamical networks with different dimensional nodes via decentralized dynamical compensation controllers, *Asian Journal of Control*, 2015, 17(2): 664-674.
- (18) **Lili Zhang**, Yinhe Wang, Qingyun Wang*, Qinruo Wang, Yun Zhang, Synchronisation of complex dynamical networks with different dynamics of nodes via decentralised dynamical compensation controllers, *International Journal of Control*, 2013, 86(10): 1766-1776.
- (19) **张丽丽**, 王银河, 王钦若, 不同维数非线性节点非线性耦合复杂动态网络渐近同步, *控制与决策*, 2014, 29(3): 537-540.
- (20) **Yulan Liu**, Shaohua Pan and Shujun Bi, Isolated calmness of solution mappings and exact recovery conditions for nuclear norm optimization problems, *Optimization*, Doi: 10.1080/02331934.2020.1723584.

- (21) **Yulan Liu**, Shujun Bi and ShaohuaPan , Several classes of stationary points for rank regularized minimization problems, *SIAM Journal on Optimization*, 30(2020)1756-1775.
- (22) **Yulan Liu** and Shaohua Pan, Regular and limiting normal cones to the graph of the subdifferential mapping of the nuclear norm, *Set-Valued and Variational Analysis*, 27(2019)71 - 85.
- (23) **Yulan Liu**, Ying Sun and Shaohua Pan, Computation of graphical derivatives of normal cone maps to a class of conic constraint sets, *Set-Valued and Variational Analysis*, 27(2019) 783–806.
- (24) **Yulan Liu** and Shaohua Pan, Strong calmness of perturbed KKT system for a class of conic programming with degenerate solutions, *Optimization*, 68(2019), 1131-1156.
- (25) **Yulan Liu** and Shujun Bi, Error bounds for non-polyhedral convex optimization and applications to linear convergence of FDM and PGM, *Applied Mathematics and Computation*, 358(2019) 418-435.
- (26) **Yulan Liu**, Shujun Bi and ShaohuaPan, Equivalent Lipschitz surrogates for zero-norm and rank optimization problems, *Journal of Global Optimization*, 72(2018) 679-704.
- (27) **X. Wu**, R. Ke, Backward errors of the linear complementarity problem, *Numerical Algorithms*, 2020, 83(3), 1249-1257
- (28) **X. Wu**, S. Vong, W. Zhou, Optimal stopping time of a portfolio selection problem with multi-assets, *Journal of the Operations Research Society of China*, DOI :10.1007/s40305-018-0223-5, online, 2019.
- (29) **X. Wu**, X. Peng, W. Li, A preconditioned general modulus-based iteration method for solving linear complementarity problems of H-matrices, *Numerical Algorithms*, 2018, 79(4): 1131~1146.
- (30) **X. Wu**, X. Li, Z. Li, A mean-field formulation for multi-period asset-liability mean-variance portfolio selection with probability constraints, *Journal of Industrial and Management Optimization*, 2018, 14(1): 249~265.
- (31) **X. Wu**, X. Peng, W. Li, Some refined eigenvalue perturbation bounds for two-by-two Block Hermitian matrices, *East Asian Journal on Applied Mathematics*, 2015, 5(2): 126~137.
- (32) **D. Liu**, W. Li, S. W. Vong. Relaxation methods for solving the tensor equation arising from the higher-order Markov chains. *Numerical Linear Algebra with Applications*, 26(5) (2019) e2260.
- (33) **D. Liu**, W. Li, S. W. Vong. The tensor splitting with application to solve multi-linear systems[J]. *Journal of Computational and Applied Mathematics*, 330(2018) 75-94.
- (34) **D. Liu**, W. Li, S. W. Vong. Tensor complementarity problems: the GUS-property and an algorithm. *Linear and Multilinear Algebra*, 66(9)(2018) 1726-1749.
- (35) **D. Liu**, W. Li, S. W. Vong. A new preconditioned SOR method for solving multi-linear systems with an M-tensor. *Calcolo*, 2020, 57(15). Online. <https://doi.org/10.1007/s10092-020-00364-8>.
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- (37) 刘冬冬, 陈艳美, 黎稳*. 关于正规矩阵对广义特征值新的扰动界限. *计算数学*, 37(2)(2016) 113-122.
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- (40) **J. Chang**, Y. Chen and L. Qi, Computing eigenvalues of large scale sparse tensors arising from a hypergraph, *SIAM Journal on Scientific Computing* 38(6) (2016) A3618-A3643.
- (41) **J. Chang**, W. Sun and Y. Chen, A modified Newton's method for best rank-one approximation to tensors, *Applied Mathematics and Computation* 216(6) (2010) 1859-1867.
- (42) **Y.G. Yang**, W. Xu, W. Jia, Q. Han. Stationary response of nonlinear system with Caputo-type fractional derivative damping under Gaussian white noise excitation. *Nonlinear Dynamics*, 2015, 79:139-146.
- (43) **Y.G. Yang**, W. Xu, X. Gu, Y.H. Sun. Stochastic response of a class of self-excited systems with Caputo-type fractional derivative driven by Gaussian white noise. *Chaos, Solitons and Fractals*, 2015, 77, 190-204.
- (44) **Y.G. Yang**, W. Xu, Y. H. Sun, X. Gu. Stochastic response of van der Pol oscillator with two kinds of fractional derivatives under Gaussian white noise excitation. *Chinese Physics B*, 2016, 25(2): 020201.
- (45) **Y.G. Yang**, W. Xu, G. Yang, W. Jia. Response analysis of a class of quasi-linear systems with fractional derivative excited by Poisson white noise. *Chaos*, 2016, 26 (8), 084302.
- (46) **Y.G. Yang**, W. Xu, Y.H. Sun, Y. Xiao. Stochastic bifurcations in the nonlinear vibroimpact system with fractional derivative under random excitation. *Communications in Nonlinear Science and Numerical Simulation*, 2017, 42: 62–72.
- (47) **Y.G. Yang**, W. Xu, G. Yang. Bifurcation analysis of a noisy vibro-impact oscillator with two kinds of fractional derivative elements. *Chaos*, 2018, 28 (4), 043106.
- (48) **Y.G. Yang**, Wei Xu. Stochastic analysis of monostable vibration energy harvesters with fractional derivative damping under Gaussian white noise excitation. *Nonlinear Dynamics*, 2018, 94(1): 639-648.
- (49) **Y.G. Yang**, W. Xu, Y. Q. Chen, B. Zhou. Bifurcation analysis of a vibro-impact viscoelastic oscillator with fractional derivative element under Gaussian white noise excitation. *International Journal of Bifurcation and Chaos*. 2018, 28(14): 1850170.
- (50) **Y.G. Yang**, Y. H. Sun, W. Xu. Stochastic Bifurcations of a Fractional-Order Vibro-Impact System Driven by Additive and Multiplicative Gaussian White Noises. *Complexity*, 2019: 6737139.
- (51) **Lu, Xianggang**, Constrained optimality for controlled switching diffusions with an application to stock purchasing. *Quant. Finance* 19 (2019), no. 12, 2069–2085.
- (52) **Lu, Xianggang**, Block trading: building up a stock position under a regime switching model. *Methodol. Comput. Appl. Probab.* 21 (2019), no. 3, 805–828.
- (53) **Lu, Xianggang**; Yin, George; Zhang, Qing; Zhang, Caojin; Guo, Xianping, Building up an illiquid stock position subject to expected fund availability: optimal controls and numerical methods. *Appl. Math. Optim.* 76 (2017), no. 3, 501–533.
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