PENGCHONG CHEN

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RESEARCH INTERESTS

Continuum robots; tendon-driven robots; fractional order control; active disturbance rejection control; motion control; servo drive

BIOGRAPHY

Pengchong Chen received his BSc in Mechanical engineering from the Zhengzhou University, China, in 2017. In 2022, he was awarded a Chinese Doctorate with his PhD in Mechanical engineering. Since 2022, he has been a Lecture at the Zhengzhou University, China.

Dr Chen's main research interests are continuum robots, motion control, fractional order modelling and control, active disturbance rejection control. His work focuses on the modelling and control of **motion** systems and robotic system for the aerospace and medical applications. His awards and honors include National Scholarship and best paper awards at international conferences. Dr Chen is serving as reviewer for IEEE Transactions on Industrial Electronics, IEEE Transactions on Industrial Informatics, IEEE/ASME Transactions on Mechatronics, IEEE Transactions on Control Systems Technology, IEEE Transactions on Power Electronics and so on.

PROFESSIONAL EXPERIENCE

30/08/2022 – Present	Lecture, Zhengzhou University, Zhengzhou, China School of Electrical and Information Engineering

EDUCATION

01/09/2017 – 30/06/2022	PhD in Mechanical Engineering, Huazhong University of Science and Technology, Wuhan, China
01/09/2013 – 30/06/2017	BSc in Mechanical Engineering, Zhengzhou University, Zhengzhou, China

AWARDS & HONOURS& SCHOLARSHIPS

18/08/2024	Best Paper Award, FOSCC 2024, Xi'An, China Paper: Robust Synthesis of Fractional-order [Proportional-integral] for Time-delay Fractional-order Systems via Flat Phase ldea
08/07/2024	First Prize in Graduate Student Design Competition (Supervisor) Title: Precise Force Sensing and Hybrid Force-Position Control for Continuum Robots Oriented to Intelligent Detection
08/07/2024	Outstanding Supervisor, Graduate Student Design Competition
12/31/2021	China National Scholarship
12/31/2021	Zhi Xing First Class Scholarship

04/10/2017	Outstanding Graduates of Henan Province
11/30/2015	National Inspiration Scholarship
11/30/2014	National Inspiration Scholarship

RESEARCH FUNDING

2025-2028	National Natural Science Foundation of China PI: Pengchong Chen
2023-2025	China Postdoctoral Science Foundation PI: Pengchong Chen
2024-2025	Key Research Programs of Higher Education Institutions in Henan Province PI: Pengchong Chen
2020-2022	National Natural Science Foundation of China PI: Ying Luo, Co-I: Pengchong Chen

REVIEW WORK

IEEE: IEEE Transactions on Industrial Electronics, IEEE Transactions on Industrial Informatics, IEEE/ASME Transactions on Mechatronics, IEEE Transactions on Control Systems Technology, IEEE Transactions on Power Electronics, IEEE Transactions on Transportation Electrification

Elsevier: ISA Transaction, Control Engineering Practice, Nonlinear Dynamic

Conference: American Control Conference, Chinese Control and Decision Conference

Others: Journal of Control and Decision, Control Theory & Applications, Control Engineering

CONFERENCE ACTIVITY

27-30/07/2019	Presentation: A New Active Disturbance Rejection Controller Design Based on Fractional Extended State Observer, 2019 Chinese Control Conference (CCC),Guangzhou, China
14-16/03/2023	Presentation: Fractional-Order Dynamics Modeling for Continuum Robots, 2023 International Conference on Fractional Differentiation and Its Applications (ICFDA), Ajman, United Arab Emirates
20-22/05/2023	Presentation: Fractional Order Active Disturbance Rejection Controller for First Order Plus Time Delay Systems, 2023 35th Chinese Control and Decision Conference (CCDC), Yichang, China

PUBLICATIONS

PEER-REVIEWED JOURNAL ARTICLE

[J1] Pengchong Chen, He Gan, Yanhong Liu, and Ying Luo. Different Model-based ADRCs Satisfying Performance Independent Control for PMSM Speed Servo System. IEEE Transactions on Industrial Electronics, 2024, doi: 10.1109/TIE.2024.3429573.

[J2] Zhenlong Wu, Yanhong Liu, Pengchong Chen*, Yangquan Chen. Economic Operation of Is-landed Micro-grids via Modified Active Disturbance Rejection Control. International Journal of Electrical Power & Energy Systems, 2024, 158: 109974. doi: https://doi.org/10.1016/j.ijepes.2024.109974

[J3] Shaohua Wang, Bolin Li, Pengchong Chen, Ying Luo. A fractional-order active disturbance rejection control for permanent magnet synchronous motor position servo system. Asian Journal of Control, 2024, doi: https://doi.org/10.1002/asjc.3393

[J4] He Gan, Zhiyan Cao, Pengchong Chen, Ying Luo, Xin Luo. Fractional-order electromagnetic modeling and identification for PMSM servo system. ISA transactions, 2024, 147: 527-539, doi: https://doi.org/10.1016/j.isatra.2024.01.036

[J5] Pengchong Chen, Ying Luo, He Gan, Yanhong Liu, Yangquan Chen. A Current and Speed Loop Decoupling Controller for PMSM Under Periodic Disturbance s. IEEE Transactions on Power Electronics, 39(6), 6889-6902, doi: 10.1109/TPEL. 2024.3377228

[J6] Pengchong Chen, He Han, Yanhong Liu, Ying Luo. Active disturbance rejection fractional or-der independent control of time delay systems with application to air floating motion platform. IEEE Transactions on Instrumentation and Measurement, 2024, 73: 1-10, doi: 10.1109/TIM.2023.3336750

[J7] Tianzhu Xun, Pengchong Chen, Shaohua Wang, Youguo Pi, Ying Luo. A fractio nal order friction model. ISA Transactions, 2023, 142: 550-561, doi: https://doi.or g/10.1016/j.isatra.2023.07.027

[J8] Fumin Li, Ying Luo, Xin Luo, Pengchong Chen, Yangquan Chen. Optimal FOPI Error Voltage Control Dead-Time Compensation for PMSM Servo System. Fractal and Fractional, 2023, 7(3): 274, doi: https://doi.org/10.3390/fractalfract7030274

[J9] Pengchong Chen, Ying Luo. An Analytical Synthesis of Fractional Order PID C ontroller Design. ISA Transactions. 2022, 131: 124-136, doi: https://doi.org/10.101 6/j.isatra.2022.04.047

[J10] Yixiao Ding, Xuan Liu, Pengchong Chen, Xin Luo, Ying Luo. Fractional-order impedance control for robot manipulator. Fractal and Fractional, 2022, 6(11): 684, doi: https://doi.org/10.3390/fractalfract6110684

[J11] Pengchong Chen, Weijia Zheng, Ying Luo, et al. Robust three-parameter fractional-order proportional integral derivative controller synthesis for permanent magnet synchronous motor speed servo system. Asian Journal of Control, 2022, 24(6): 3418-3433, doi: https://doi.org/10.1002/asjc.2832

[J12] Pengchong Chen, Ying Luo. Analytical Fractional Order PID Controller Design with Bode's Ideal Cut-off Filter for PMSM Speed Servo System. IEEE Transactions on Industrial Electronics, 2022, 70(2): 1783-1793, doi: 10.1109/TIE.2022.3158009

[J13] Pengchong Chen, Ying Luo, Weijia Zheng, Zhiqiang Gao, Yangquan Chen. Fract

ional Order Active Disturbance Rejection Control with the Idea of Cascaded Fractional Order Integrator Equivalence. ISA Transactions, 2021, 114: 359-369, doi: https://doi.org/10.1016/j.isatra.2020.12.030

[J14] Pengchong Chen, Ying Luo, Yibing Peng, Yangquan Chen. Optimal Robust Fractional Order PI λ D Controller Synthesis for First Order Plus Time Delay Systems. ISA Transactions, 2021, 114: 136-149, doi: https://doi.org/10.1016/j.isatra.2020.12.043

[J15] Pengchong Chen, Ying Luo, Yibing Peng, et al. Optimal Fractional-Order Active Disturbance Rejection Controller Design for PMSM Speed Servo System. Entropy, 2021, 23(3): 262, doi: https://doi.org/10.3390/e23030262

[J16] Pengchong Chen, Ying Luo. A Two-Degree-of-Freedom Controller Design Satisfying Separation Principle with Fractional Order PD and Generalized ESO. IEEE/ASME Transactions on Mechatronics, 2022, 27(1): 137-148, DOI: 10.1109/TMECH.2021.3059160

PAPERS IN CONFERENCE PROCEEDINGS

[C1] Pengchong Chen, Yanhong Liu, Zhenlong Wu, Ying Luo, and Yangquan Chen, "Fractional Order Active Disturbance Rejection Controller for First Order Plus Time Delay Systems," 2023 35th Chinese Control and Decision Conference (CCDC), Yichang, China, 2023, pp. 839-844, doi: 10.1109/CCDC58219.2023.10327459.

[C2] Xuan Liu, Pengchong Chen, and Ying Luo, "Digital Twin-Based Fractional Order Controller Optimization for Industrial Robot." Proceedings of the ASME 2021 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference. Volume 7: 17th IEEE/ASME International Conference on Mechatronic and Embedded Systems and Applications (MESA). Virtual, Online. August 17–19, 2021. V007T07A029. ASME. https://doi.org/10.1115/DETC2021-72405

[C3] Jihao Sun, Pengchong Chen, and Ying Luo, "A Fractional Order Control and Correction Strategy for EtherCAT Communication Clock Drift." Proceedings of the ASME 2021 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference. Volume 7: 17th IEEE/ASME International Conference on Mechatronic and Embedded Systems and Applications (MESA). Virtual, Online. August 17–19, 2021. V007T07A023. ASME. https://doi.org/10.1115/DETC2021-70814

[C4] Pengchong Chen, Ying Luo, Weijia Zheng, and Zhiqiang Gao, "A New Active Disturbance Rejection Controller Design Based on Fractional Extended State Observer," 2019 Chinese Control Conference (CCC), Guangzhou, China, 2019, pp. 4276-4281, doi: 10.23919/ChiCC.2019.8865339.

[C5] Huifan Shi, Yanhong Liu, **Pengchong Chen***, Ying Luo, Yangquan Chen, "Fractional-Order Dynamics Modeling for Continuum Robots," 2023 International Conference on Fractional Differentiation and Its Applications (ICFDA), Ajman, United Arab Emirates, 2023, pp. 1-5, doi: 10.1109/ICFDA58234.2023.10153212.

[C6] Zhenlong Wu, Yuquan Chen, **Pengchong Chen***, Yanhong Liu, Yangquan Chen, Robust Synthesis of Fractional-order [Proportional Integral] for Time-delay Fractional-order Systems via Flat Phase Idea, 2024 Fractional Order Systems and Control Conference,

Xi'an, China, 2024.

PATENTS

[P1] Ying Luo, Pengchong Chen. 基于分数阶扩张状态观测器的自抗扰控制方法及控制器, Chinese Patent, Field 03/01/2019, Published 18/09/2020

[P2] Ying Luo, Pengchong Chen. 一种时滞系统最优鲁棒分数阶 PID 控制器的优化方法, Chinese Patent, Field 19/05/2020, Published 31/08/2021

[P3] Ying Luo, Pengchong Chen. 一种调控电机速度环的分数阶自抗扰控制器的设计方法, Chinese Patent, Field 28/05/2020, Published 02/07/2021

[P4] Ying Luo, Pengchong Chen. Designing Method for FOPD-GESO Controller, US 20230400824, Field 27/03/2021, Published 14/12/2023

[P5] Ying Luo, Pengchong Chen. 一种 FOPD-GESO 控制器的设计方法, Chinese Patent, Field 29/06/2020, Published 03/08/2021

[P6] Ying Luo, Pengchong Chen. 一种分数阶 PID 控制器的系统化解析设计方法, Chinese Patent, Field 27/03/2021, Published 14/12/2023

[P7] Ying Luo, Weijia Zheng, Pengchong Chen. 一种分数阶 PID 控制器及其参数整定方法, Chinese Patent, Field 22/08/2022

[P8] Zhenglong Wu, Yanhong Liu, Pengchong Chen, Benyan Huo, Lei Yang, Fangyuan Li, Yaqiang Liu. 一种基于增益调度的改进自抗扰控制实现方法及控制系统, Chinese Patent, Field 17/01/2013

[P9] Yanhong Liu, Kuan Zhang, Benyan Huo, Lei Yang, Pengchong Chen, Yazhou Miao, Huifan Shi. 一种基于视觉的绳驱动连续体机器人的末端位置检测方法, Chinese Patent, Field 06/06/2023

[P10] Pengchong Chen, Yanhong Liu, Ying Luo. 基于非线性动力学模型的连续体机器人控制器设计方法, Chinese Patent, Field 12/01/2024

[P11] Pengchong Chen, Yanhong Liu, Ying Luo. 一种基于时滞系统的反馈控制器设计方法, Chinese Patent, Field 28/11/2023, Published 14/12/2023

[P12] Zhenglong Wu, Bingke Jia, Yanhong Liu, Pengchong Chen, Bingnan Li, Guizhou Cao, Xiaoke Zhang. 一种基于增益调度的复合自抗扰控制方法和系统, Chinese Patent, Field 14/05/2014