JIAHAO CHEN

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m&m lab · ORCID · Google Scholar · Github

Electrical engineering Ph.D. interested in machines, drives, robots, and direct drive technologies.

EXPERIENCE

Dec. 2022 – Present

Assistant Professor, CiPES, SIST, ShanghaiTech University, China

- Director of motor and motion control lab (a.k.a., m&m lab)
- Projects:
  - Magnetically levitated system and bearingless motor
  - Bipedal robot and lightweight robot arm

Dec. 2020 – Dec. 2022

Postdoctoral Fellow, Nanyang Technological University, Singapore

- Projects:
  - Bearingless slice motor with disposable rotor
  - Direct drive (gearless) electric machines for two-wheel vehicles
  - Advanced topics in sensorless control of electric motor drives
- Advisor: Professor **Christopher H. T. Lee**

July 2020 – Nov. 2020

Software Developer, Stone Motion Control, Shanghai, China

- Projects:
  - Self-commissioning, auto-tuning, and frequency-domain analysis for servo drives.
  - Hall sensor based full-closed-loop-controlled motor drive for AGV applications.

Sept. 2018 – Sept. 2019

Research Scholar, WEMPEC, University of Wisconsin-Madison, USA

- Project: Bearingless motors for industrial applications of significant power
  - FEA based machine design and optimization and its automation using Python
  - Prototype fabrication and testing
- Advisor: Professor **Eric L. Severson**

Jan. 2014 – Apr. 2014

Intern, Quality Control Department, Bosch Power Tools (China) Co., LTD

- Used Python and VBA to achieve automatic email generation and quality evaluation computing, which greatly alleviated manual labor. Appreciated by the director for work ethic and communication skills.

EDUCATION

Sept. 2014 – Dec. 2019

Ph.D. in Electrical Engineering, Zhejiang University

- Project: National key basic research program of China (973 project, grant 2013CB035604)
  - Conducted research in parameter estimation and sensorless control of induction motor drives for ship propulsion.
  - Edited final report and power point for project acceptance.
- Thesis: "Adaptive Observer Design for Sensorless Induction Motor Drives"
- Advisor: Professor **Jin Huang**
- Main subjects: Nonlinear System, Modern Theory of Electromagnetic Field, Transient Analysis of Electric Machines, Linear Electric Machine, Robust Control, Intelligent System Theory.

Sept. 2010 – July 2014

B.Sc. in Electrical Engineering, Zhejiang University

- GPA: 4.24/5
- Thesis: "A Survey on Permanent Magnet Motor Systems"
- Advisor: Professor **Jin Huang**
- Main subjects: Electric Machinery, Power Electronics Technology, Control Theory, Modern Theory of Permanent Magnet Motor, Digital and Analogical Electronics, Mathematics and Physics, Computer Aided Design, Programmable Logic Controller.

SERVICES

Reviewer: Journal (Number of Reviews)

- IEEE journal of emerging and selected topics in power electronics (21),
- IEEE transactions on automation science and engineering. (1)
- IEEE transactions on energy conversion (6),
- IEEE transactions on industrial electronics (39),
- IEEE transactions on power electronics (31),
- IEEE transactions on transportation electrification (12),
- IEEE transactions on industry applications (8),
- IET electric power applications (7),
- IET power electronics (4),
- IET control theory & applications (2),
- IEEE Access (3),
- Actuators (1),
- World electric vehicle journal (2),
- Journal of control science and engineering (1),
- IEEE International Electric Machines & Drives Conference (IEMDC) 2019,
- IEEE Conference on Electromagnetic Field Computation (CEFC) 2020,
- IEEE 4th International Electrical and Energy Conference (CIEEC) 2021.

Open Sourced Project on Motor Control Simulation

- emachinery: A python package for motor control simulation and its visualization.
- ACMSIMC_TUT: Tutorial on C language based motor control simulation.
- ACMSimPy: motor control simulation in Python accelerated by Numba.

Open Sourced Project on Motor Design and Optimization

- ACMOP: A python and FEA based multi-objective machine optimization framework.

User at Zhihu.com with 10000+ followers and 12800+ favorites

- https://www.zhihu.com/people/horychen

PUBLICATIONS

Part I: AC Motor Sensorless Control

1. **J. Chen**, J. Mei, X. Yuan, Y. Zuo, J. Zhu, and C. H. T. Lee, "Online Adaptation of Two-Parameter Inverter Model in Sensorless Motor Drives"
   IEEE Transactions on Industrial Electronics, vol. 69, no. 10, Oct. 2022. **(IF： 8.2)**
2. **J. Chen**, J. Mei, X. Yuan, Y. Zuo, and C. H. T. Lee, "Natural Speed Observer for Nonsalient AC Motors"
   IEEE Transactions on Power Electronics, 2021, doi: 10.1109/TPEL.2021.3094583. **(IF: 6.2)**
3. **J. Chen**, X. Yuan, F. Blaabjerg, and C. H. T. Lee, "Overview of Fundamental Frequency Sensorless Algorithms for AC Motors: a Unified Perspective"
   IEEE Journal of Emerging and Selected Topics in Power Electronics, Early Access, Aug 2022.

Part II: Parameter Estimation for Sensorless Induction Motors

4. **J. Chen** and J. Huang, "Alternative Solution Regarding Problems of Adaptive Observer Compensating Parameters Uncertainties for Sensorless Induction Motor Drives",
   IEEE Transactions on Industrial Electronics, vol. 67, no. 7, July 2020. **(IF： 8.2)**
5. **J. Chen** and J. Huang, "Globally Stable Speed-Adaptive Observer with Auxiliary States for Sensorless Induction Motor Drives",
   IEEE Transactions on Power Electronics, vol. 34, no. 1, Jan 2019. **(IF: 6.2)**
6. **J. Chen**, J. Huang and Y. Sun, "Resistances and Speed Estimation in Sensorless Induction Motor Drives Using a Model with Known Regressors",
   IEEE Transactions on Industrial Electronics, vol. 66, no. 4, April 2019. (**IF: 8.2)**
7. **J. Chen** and J. Huang, "Application of Adaptive Observer to Sensorless Induction Motor Via Parameter-dependent Transformation",
   IEEE Transactions on Control Systems Technology, vol. 27, no. 6, pp. 2630-2637, Sept 2019. **(IF: 5.3)**
8. **J. Chen** and J. Huang, "Stable Simultaneous Stator and Rotor Resistances Identification for Speed Sensorless Induction Motor Drives: Review and New Results",
   IEEE Transactions on Power Electronics, vol. 33, no. 10, pp. 8695-8709, Oct 2018. **(IF: 6.2)**
9. **J. Chen** and J. Huang, "Online Decoupled Stator and Rotor Resistances Adaptation for Speed Sensorless Induction Motor Drives by a Time-division Approach",
   IEEE Transactions on Power Electronics, vol. 32, no. 6, pp. 4587-4599, June 2017. **(IF: 6.2)**
10. **J. Chen**, J. Huang, and M. Ye, "Totally Adaptive Observer for Speed Sensorless Induction Motor Drives: Simply a Cost of Extra Energy Consumption",
    in Proc. of 2017 IEEE International Electric Machines and Drives Conference (IEMDC), May 2017, Miami, FL, USA.
11. L. Zhao, J. Huang, **J. Chen**, and M. Ye, "A Parallel Speed and Rotor Time Constant Identification Scheme for Indirect Field Oriented Induction Motor Drives",
    IEEE Transactions on Power Electronics, vol. 31, no. 9, pp. 6494-6503, Sept 2016. **(IF: 6.2)**

Part III: Beairngless Motor

12. **J. Chen**, J. Zhu, and E. L. Severson, "Review of Bearingless Motor Technology for Significant Power Applications",
    IEEE Transactions on Industry Applications, vol. 56, no. 2. **(IF: 3.5)**
13. **J. Chen**, Y. Fujii, M. Johnson, A. Farhan, and E. L. Severson, "Optimal Design of the Bearingless Induction Motor",
    IEEE Transactions on Industry Applications, vol. 57, no. 2, March-April 2021. **(IF: 3.5)**
14. **J. Chen**, M. Johnson, A. Farhan, Z. Wang, Y. Fujii, and E. L. Severson, "Reduced Axial Length Pole-Specific Rotor for Bearingless Induction Machines",
    IEEE PES Transactions on Energy Conversion, vol. 37, no. 4, Dec. 2022 **(IF: 4.3)**
15. **J. Chen** and E. L. Severson, "Analysis of DPNV Winding For Bearingless Induction Motors with Reduced Axial Length Pole Specific Rotor",

in 17th International Symposium on Magnetic Bearing (**ISMB**), August 18-21, 2021, Rio de Janeiro.

16. **J. Chen**, A. Farhan, M. Johnson, and E. L. Severson, "Design of Bearingless Permanent Magnet Motors Using No Voltage Combined Windings,"
in Proc. of The 10th International Conference on Power Electronics, Machines and Drives (**PEMD**), Dec 2020, Virtual Conference.
17. **J. Chen** and E. L. Severson, "Design and Modeling of the Bearingless Induction Motor",
in Proc. of 2019 IEEE International Electric Machines and Drives Conference (**IEMDC**), May 2019, San Diego, CA, USA.
18. **J. Chen** and E. L. Severson, "Optimal Design of the Bearingless Induction Motor for Industrial Applications,"
in Proc. of IEEE Energy Conversion Congress and Exposition (**ECCE**), Sept 2019, Baltimore, MD, USA.

Others (PM Motor Drive, Vernier Machine, Multi-phase Machine, and Accelerated Calculation)

19. Y. He, **J. Chen**, Y. Zhou, L. Cao and C. H. T. Lee, "A Two Degree-of-Freedom Rotary-Linear Machine with Transverse-Flux Structure",
IEEE Transactions on Industrial Electronics, 2023 doi: 10.1109/TIE.2023.3247791.
20. J. Zhu, Y. Zuo, H. Chen, **J. Chen** and C. H. T. Lee, "Deep-investigated Analytical Modeling of a Surface Permanent Magnet Vernier Motor" ,
IEEE Transactions on Industrial Electronics, 2021, doi: 10.1109/TIE.2021.3134075.
21. Y. Zuo, **J. Chen**, X. Zhu, and C. H. T. Lee, "Different Active Disturbance Rejection Controllers Based on the Same Order GPI Observer",
IEEE Transactions on Industrial Electronics, 2021, doi: 10.1109/TIE.2021.3118378.
22. X. Yuan, **J. Chen**, W. Liu and C. H. T. Lee, "A Linear Control Approach to Design Digital Speed Control System for PMSMs",
in IEEE Transactions on Power Electronics, 2022, doi: 10.1109/TPEL.2022.3146174.
23. X. Yuan, **J. Chen**, C. Jiang and C. H. T. Lee, "Discrete-time Current Regulator for AC Machine Drives" ,
IEEE Transactions on Power Electronics, 2021, doi: 10.1109/TPEL.2021.3130229.
24. X. Yuan, J. Mei, **J. Chen**, Y. Zuo and C. H. T. Lee, "A Digital Current Controller based on Active Resistance Term Feedback for SPMSM Drives",
IEEE Transactions on Power Electronics, 2022, doi: 10.1109/TPEL.2022.3153057.
25. X. Yuan, **J. Chen**, Y. Zuo and C. H. T. Lee, "Deadbeat Predictive Current Control Considering Inverter Nonlinearity for Permanent Magnet Synchronous Machine Drives",
in Proc. of IEEE Energy Conversion Congress and Exposition (ECCE), 2021, pp. 4955-4960, doi: 10.1109/ECCE47101.2021.9595917.
26. T. Wang, J. Huang, M. Ye, **J. Chen**, W. Kong, M. Kang, and M. Yu, "An EMF Observer for PMSM Sensorless Drives Adaptive to Stator Resistance and Rotor Flux-Linkage",
IEEE Journal of Emerging and Selected Topics in Power Electronics, vol. 7, no. 3, pp. 1899-1913, Sept. 2019.
27. T. Wang, J. Huang, B. Lin, M. Kang, **J. Chen**, and W. Kong, "Eccentricity Detection of a Six-phase Induction Motor with HFI",
IET Electric Power Applications, 2019, 13, (11), pp. 1717-1725, doi: 10.1049/iet-epa.2018.5733.
28. C. Di, I. Petrov, J. Pyrhönen and **J. Chen**, "Accelerating the Time-Stepping Finite-Element Analysis of Induction Machines in Transient-Magnetic Solutions",
IEEE Access, doi: 10.1109/ACCESS.2019.2938269.

PATENTS

I am the coholder of 7 Chinese patents and 1 US patent.

1. E. L. Severson and **J. Chen**, "Rotor Winding with a Neutral Plate for a Bearingless Induction Machine", Jun 17, 2021, Online: https://patents.justia.com/patent/20210184550
https://patents.google.com/patent/US20210184550A1/en