NING TIAN

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SUMMARY

- 8 year modeling and algorithm development for advanced lithium-ion battery management
- 3 year hands-on experience with battery characterization, validation and cycling aging test
- 3 year CFD analysis of thermal systems such as gas turbine blades and battery packs

EDUCATION

Ph.D., University of Kansas, Lawrence, Kansas — Awarded 2020

Dissertation: *A study of computationally efficient advanced battery management: Modeling, identification, estimation and control* (defended with honors)

Major: Mechanical Engineering, Advisor: Dr. Huazhen Fang

M.S., Northwestern Polytechnical University, Xi'an, China — Awarded 2015

Thesis: *Numerical and experimental investigation of turbine blade trailing edge internal cooling*

Major: Engineering Thermal Physics, Advisor: Dr. Huiren Zhu

B.S., Northwestern Polytechnical University, Xi'an, China — Awarded 2012

Major: Thermal Energy and Power Engineering (graduated with honors)

RESEARCH EXPERIENCE

ISS Lab (Battery Management), University of Kansas — 2015–2019

Graduate Research Assistant, Advisor: Dr. Huazhen Fang

- Conducted research on embedded system application-oriented advanced lithium-ion battery management, including battery equivalent circuit modeling, parameter identification, state of charge estimation, battery pack spatial thermal field estimation, and optimal charging
- Published 5 journal papers and 7 conference papers on advanced battery management system
- Directed lab battery tester operation and oversaw around ten students in battery testing

Heat Transfer and Cooling Lab, Northwestern Polytechnical University — 2012–2015

Graduate Research Assistant, Advisor: Dr. Huiren Zhu

- Performed CFD simulation to study impingement cooling at jet engine turbine blade
- Conducted heat transfer measurement of model blade using transient liquid crystal technique

WORK EXPERIENCE

Battery Technology - BMS, Apple Inc., Cupertino, California — 07/12/2021–Present

Battery Algorithm Engineer, Manager: Dr. Wei He

- Conduct battery peak power management algorithm development

Battery Technology Group, Romeo Power, Inc., Cypress, California 08/03/2020–07/11/2021

Battery Engineer, Manager: Dr. Hector Perez

- Performed battery cell/module modeling and data analysis
- Supported battery management algorithm development

Battery Simulation Group, Ansys, Inc., Lebanon, New Hampshire 05/20/2019–08/16/2019

Battery Software Development Intern, Manager: Dr. Shaoping Li

- Wrote tutorials for ANSYS Fluent multiphysics-based battery modeling package
- Tested ANSYS Fluent battery model identification tool and user-defined battery model
- Performed CFD simulation of thermal field of industrial battery packs using ANSYS Fluent

TEACHING EXPERIENCE

Mechanical Engineering Department, University of Kansas Spring 2020

Graduate Teaching Assistant for ME455 Measurements and Experimentation

- Led 4 lab sessions every week and instructed students (around 70) on use of lab equipment such as function generator, oscilloscope, DMM, transducer and on lab experiments of data acquisition, signal processing, circuit design such as voltage divider, amplifier and low-pass filter

Mechanical Engineering Department, University of Kansas Fall 2019

Graduate Teaching Assistant for ME320 Dynamics and ME321 Dynamic Simulations

- Assisted with ME320 in-class group discussions and quiz sessions and held office hours
- Taught students (around 90) in ME321 lab setting for dynamic simulation using Adams

JOURNAL PAPERS

J.8 Y. Hu, R. A. de Callafon, **N. Tian** and H. Fang, "Tensor network based MIMO volterra model for lithium-ion batteries," accepted by *IEEE Transactions on Control Systems Technology* (Impact factor: 5.312), 2022

J.7 Y. Hu, R. A. de Callafon, **N. Tian** and H. Fang, "Modeling of lithium-ion batteries via tensor-network-based volterra model," *IFAC-PapersOnLine*, vol. 54, no. 20, pp. 509–515, 2021

J.6 H. Movahedi, **N. Tian**, H. Fang and R. Rajamani, "Hysteresis compensation and nonlinear observer design for state-of-charge estimation using a nonlinear double-capacitor Li-ion battery model," *IEEE/ASME Transactions on Mechatronics* (Impact factor: 5.673), vol. 27, no. 1, pp. 594–604, 2021

J.5 **N. Tian**, H. Fang and Y. Wang, "Real-time optimal lithium-ion battery charging based on explicit model predictive control," *IEEE Transactions on Industrial Informatics* (Impact factor: 9.112), vol. 17, no. 2, pp. 1318–1330, 2020

J.4 **N. Tian**, Y. Wang, J. Chen and H. Fang, "One-shot parameter identification of an equivalent circuit model for batteries: Methods and validation," *Journal of Energy Storage* (Impact factor: 3.762), vol. 29, pp. 101282, 2020

J.3 **N. Tian**, H. Fang, J. Chen and Y. Wang, "Nonlinear double-capacitor model for rechargeable batteries: Modeling, identification and validation," *IEEE Transactions on Control Systems Technology* (Impact factor: 5.312), vol. 29, no. 1, pp. 370–384, 2020

J.2 **N. Tian**, H. Fang and Y. Wang, "3-D temperature field reconstruction for a lithium-ion battery pack: A distributed Kalman filtering approach," *IEEE Transactions on Control Systems Technology* (Impact factor: 5.312), vol. 27, no. 2, pp. 847–854, 2019

J.1 H. Fang, **N. Tian**, Y. Wang, M. Zhou and M.A. Haile, "Nonlinear Bayesian estimation: From Kalman filtering to a broader horizon," *IEEE/CAA Journal of Automatica Sinica* (Impact factor: 5.129), vol. 5, no. 2, pp. 401–417, 2018

CONFERENCE PAPERS

C.8 H. Movahedi, **N. Tian**, H. Fang and R. Rajamani, "Hysteresis compensation in state-of-charge estimation with a nonlinear double-capacitor Li-ion battery model," accepted by *the 2021 American Control Conference*, New Orleans, LA, USA, May. 25–28, 2021

C.7 M. Proctor, **N. Tian** and H. Fang, "Battery state-of-charge estimation based on nonlinear double-capacitor model and extended Kalman filter," in *Proceedings of the 2020 IEEE Annual Green Technologies Conference*, Oklahoma City, OK, USA, Apr. 7–9, 2020

C.6 **N. Tian**, H. Fang and Y. Wang, "Parameter identification of the nonlinear double-capacitor model for lithium-ion batteries: From the Wiener perspective," in *Proceedings of American Control Conference*, Philadelphia, PA, USA, Jul. 10–12, 2019

C.5 **N. Tian**, H. Fang and Y. Wang, "Real-time optimal lithium-ion battery charging based on explicit model predictive control," in *Proceedings of the 28th International Symposium on Industrial Electronics*, Vancouver, Canada, Jun. 12–14, 2019

C.4 **N. Tian**, H. Fang and J. Chen, "A new nonlinear double-capacitor model for rechargeable batteries," in *Proceedings of the 44th Annual Conference of the IEEE Industrial Electronics Society*, Washington D.C., USA, Oct. 21–23, 2018

C.3 **N. Tian**, Y. Wang, J. Chen and H. Fang, "On parameter identification of an equivalent circuit model for lithium-ion batteries," in *Proceedings of IEEE Conference on Control Technology and Applications*, Kohala Coast, HI, USA, Aug. 27–30, 2017

C.2 **N. Tian** and H. Fang, "Distributed Kalman filtering-based three-dimensional temperature field reconstruction for a lithium-ion battery pack," in *Proceedings of American Control Conference*, Seattle, WA, USA, May. 24–26, 2017

C.1 **N. Tian**, H. Zhu and M. Zhang, "Numerical analysis of flow and heat transfer of inclined impingement in the trailing edge of turbine blade," in *International Symposium on Jet Propulsion and Power Engineering*, Beijing, China, Sep. 15–19, 2014

PATENT

N. Tian and H. Zhu, "An inclined impingement cooling channel," Patent No. CN104,265,376B, April 2016 (assigned to Northwestern Polytechnical University, Xi'an, China)

PRESENTATIONS

P.7 "Advanced lithium-ion battery management," at 2019 American Control Conference, Philadelphia, Jul. 11, 2019

P.6 "Parameter identification of the nonlinear double-capacitor model for Li-ion batteries: From the Wiener perspective," at 2019 American Control Conference, Philadelphia, Jul. 10, 2019

P.5 "A new nonlinear double-capacitor model for rechargeable batteries," at 8th Midwest Workshop on Control and Game Theory at Washington University in St. Louis, Apr. 27, 2019

P.4 "A new equivalent circuit model for rechargeable batteries," at 13th Berkeley Energy & Resources Collaborative (BERC) Energy Summit, UC Berkeley, Feb. 21, 2019

P.3 "A new nonlinear double-capacitor model for rechargeable batteries," at 44th Annual Conference of the IEEE Industrial Electronics Society, Washington D.C., Oct. 22, 2018

P.2 "Model predictive control for battery charging," at 1st Model Predictive Control Summer School, University of Wisconsin-Madison, Jul. 28, 2017

P.1 "Distributed Kalman filtering-based 3-D temperature field reconstruction for a lithium-ion battery pack," at 2017 American Control Conference, Seattle, Washington, May. 24, 2017

EXTRACURRICULAR EXPERIENCE

Orientation Leader, Summer Orientation at University of Kansas, Summer 2018

Education Volunteer, Lab Outreach at Douglas County Juvenile Detention Center, 2016–2019

Education Volunteer, Engineering Expo and Summer Camp at University of Kansas, 2016

Vice President, Student Branch of Shaanxi Society of Engineering Thermophysics, 2014–2015

Sessional Lecturer, Xi'an Electric Power College, Xi'an, China, Fall 2013

Freshman Mentor, Northwestern Polytechnical University, Xi'an, China, Fall 2011

Volunteer Leader, International Horticultural Exposition, Xi'an, China, July 2011

Education Volunteer, Xinfeng Elementary School, Zhangye, China, July 2009

ACADEMIC SERVICE

Student Liaison for ASME Dynamic Systems Control Division (DSCD)

- Organized Student Career Advising Session (10 panel professionals and around 40 attendees) virtually at American Control Conference (ACC) 2020 in Denver, Colorado
- Co-organized Student Career Advising Session (10 panel professionals and around 50 student attendees) at Dynamic Systems and Control Conference (DSCC) 2019 in Park City, Utah

Paper Reviewer

- IEEE Transactions on Industrial Electronics, IEEE Transactions on Transportation Electrification, IEEE Transactions on Intelligent Transportation Systems, Journal of Control, Automation and Electrical Systems
- CDC (2019–2022), ACC (2017–2021), IFAC World Congress (2020), DSCC (2017–2020), Modeling, Estimation and Control Conference (2021–2022), IEEE Conference on Control Technology and Applications (2017–2018), IEEE International Conference on Control and Automation (2017–2022), IEEE/ASME International Conference on Advanced Intelligent Mechatronics (2019–2022), etc.

AWARDS

Tradition of Excellence Award, University of Kansas	2019
International Student Leader, KU International Student Services	2018, 2019
Student Travel Award, 2019 URSSI Winter School in Research Software Engineering	2019

Student Travel Award, 2019 American Control Conference 2019

Student Travel Award, 8th Midwest Workshop on Control and Game Theory 2019

GEA Travel Award, KU Engineering School 2018, 2019

Graduate Presentation Travel Award, University of Kansas 2018

Student Travel Award, 1st Model Predictive Control Summer School 2017

MEMBERSHIP

IEEE Membership 2017–2022

SKILLS

MATLAB/Simulink, C, Python, LabVIEW, SolidWorks, Adams, ANSYS Fluent, UG, AutoCAD, CSS, HTML, Circuit Design, Arduino