PRECEDE 2023

THE 2023 IEEE INTERNATIONAL CONFERENCE ON PREDICTIVE CONTROL OF ELECTRICAL DRIVES AND POWER ELECTRONICS

CONFERENCE BROCHURE

June 16-19, 2023 Wuhan, China

CONTENTS

❖ Welcome Message

Dear Colleagues and Friends,

It is our great honor to invite you to participate in the 2023 IEEE International Conference on Predictive Control of Electrical Drives and Power Electronics (PRECEDE 2023), which will be held at the East Lake International Conference Center, Wuhan, China, during June 16-19, 2023.

The goal of the conference is to bring together researchers from both academia and industry, and to share research findings and discuss future developments in model predictive control for electrical drives and power electronics. Numerous excellent experts and talents in the field of model prediction both domestically and internationally will attend the conference, which is a great opportunity to exchange ideas and promote the development in this discipline.

This conference comprises various tutorials, invited speeches, oral and poster presentations. After a rigorous reviewing process by the technical committee and other experts of model predictive control, all accepted papers of PRECEDE 2023 will be published in conference proceedings by IEEE and included in the IEEE Xplore Digital Library. Meanwhile, all conference papers can be submitted to IEEE Transactions on Power Electronics (TPEL) after further modifications as required by the TPEL.

As the host and conference organizer, we would like to express our heartfelt thanks to the sponsorship of Huazhong University of Science and Technology (HUST) and IEEE Power Electronics Society (PELS). We thank all the sponsors, exhibitors, session chairs, volunteers, and conference staff for your great dedication to make this event a success. We are very grateful for the hard work of the experts on various committees. Your continuous efforts made it possible for PRECEDE 2023 to proceed smoothly. Taking this opportunity, we would like to express our deepest gratitude to all reviewers who have reviewed all technical papers professionally to ensure the high-quality publication of the conference proceedings.

We sincerely hope that all participants will have in-depth discussions with each other and build lasting friendships during this conference. Wish you a pleasant and fruitful stay in Wuhan.

Yours sincerely,

General Chair
Prof. Wei Xu
HUST, China

General Co-Chair
Prof. Kai Yang
HUST, China

❖ Conference Information

◆ Venue

East Lake Hotel--International Conference Center

◆ Topics

Artificial Intelligence in Predictive Control Frame
Data-Driven (Modeless) Predictive Control Techniques
New Model Predictive Control (MPC) Methods for Electrical Drives and Power Converters
Robust Predictive Control Solutions
Implementation on Issues of MPC (e.g. FPGA, DSP, etc.)
Related Predictive Control Techniques in Renewable Energy Devices or Systems

◆ Organizers

Huazhong University of Science and Technology (HUST)
School of Electrical and Electronic Engineering (SEEE) of HUST
The Institute of Electrical and Electronics Engineers (IEEE)
IEEE Power Electronics Society

◆ Co-Organizer

Institute of New Energy, Wuhan

◆ Media

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❖ Conference Committees

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Cheng Luo	Huazhong Uni. of Sci. and Tech., China

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Gaolin Wang	Harbin Inst. of Tech., China
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Xiaoguang Zhang	North China Uni. Tech., China
Zedong Zheng	Tsinghua Uni., China
Minghao Zhou	Harbin Uni. of Sci. and Tech., Chi

❖ Conference Schedule

Conference Schedule

Friday, June 16th

09:00-14:00	Registration Convention Center Gate No.3 (会议中心3号门)	
14:00-17:00	Registration	14:00-15:30 Tutorial 1 15:30-17:00 Tutorial 3 Moli Hall(茉莉厅)
		14:00-15:30 Tutorial 2 15:30-17:00 Tutorial 4 Dingxiang Hall(丁香厅)
		14:00-17:00 Tutorial 5 Xiantao Hall(仙桃厅)
17:00-19:00		17:00-19:00 Buffet Dinner Huangli Hall, B1F, Building 2, Tingtao No.2 (听涛2号负一楼黄鹂厅)
19:00-21:00	Registration Convention Center Gate No.3 (会议中心3号门)	

Saturday, June 17th

08:00-09:00	Registration Convention Center Gate No.3(会议中心3号门)
09:00-09:30	Opening Ceremony Qingchuan Hall(晴川厅)
09:30-09:45	Taking Photos
09:45-10:45	Invited Talk 1 Latest Advances of Model Predictive Control in Electrical Drives Qingchuan Hall(晴川厅)
10:45-11:00	Coffee Break
11:00-12:00	Invited Talk 2 Disturbance Rejection Model Predictive Control in Mechatronic Systems Qingchuan Hall(晴川厅)
12:00-14:00	Lunch & Lunch Break Huangli Hall, B1F, Building 2, Tingtao No.2 (听涛2号负一楼黄鹂厅)
14:00-15:00	Invited Talk 3 How Model Predictive Control is Revolutionizing the High Power Electronics Industry Qingchuan Hall(晴川厅)
15:00-16:00	Invited Talk 4 Model Predictive Control for Microgrids: From power electronic converters to energy management Qingchuan Hall(晴川厅)
16:00-16:15	Coffee Break
16:15-17:15	Invited Talk 5 Application of Predictive Control in Sensorless Drives Qingchuan Hall(晴川厅)
17:30-20:00	Buffet Dinner Huangli Hall, B1F, Building 2, Tingtao No.2 (听涛2号负一楼黄鹂厅)

Sunday, June 18th

08:30-10:10	Oral Session 1 Moli Hall (茉莉厅)	Oral Session 2 Dingxiang Hall (丁香厅)	Oral Session 3 Qianjiang Hall (潜江厅)
10:10-10:20	Coffee Break		
10:20-12:00	Oral Session 4 Moli Hall (茉莉厅)	Oral Session 5 Dingxiang Hall (丁香厅)	Oral Session 6 Qianjiang Hall (潜江厅)
12:00-14:00	Lunch & Lunch Break Huangli Hall, B1F, Building 2, Tingtao No.2 (听涛2号负一楼黄鹂厅)		
14:00-15:40	Oral Session 7 Moli Hall (茉莉厅)	Oral Session 8 Dingxiang Hall (丁香厅)	Oral Session 9 Qianjiang Hall (潜江厅)
15:40-16:00	Coffee Break		
16:00-17:40	Oral Session 10 Moli Hall (茉莉厅)	Oral Session 11 Dingxiang Hall (丁香厅)	Oral Session 12 Qianjiang Hall (潜江厅)
18:00 - 20:00	Gala Dinner & Performance Changjiang Hall(长江厅)		

Monday, June 19th

09:00-10:00	Poster Session 1 Public Area(公共区域)	Poster Session 2 Public Area(公共区域)
10:00-10:15	Coffee Break	
10:15-11:15	Poster Session 3 Public Area(公共区域)	Poster Session 4 Public Area(公共区域)
11:15-11:45	Award Ceremony & Closing Qianjiang Hall (潜江厅)	
12:00-14:00	Lunch & Lunch Break Huangli Hall, B1F, Building 2, Tingtao No.2 (听涛2号负一楼黄鹂厅)	
14:00-17:30	Technical Tour Including: Wuhan National High Magnetic Field Center School of Electrical and Electronic Engineering, HUST ……	

❖ Conference Agenda

Friday, June 16th		
09:00-21:00	Registration	Convention Center Gate No.3 (会议中心 3 号门)
Tutorial		
Chair: **Dr. Xi Chen** *Huazhong University of Science and Technology, China*		
Time	Topic	Location
14:00-15:30	**Tutorial 1:** Predictive Control of Power Converters in Hybrid Micro-Energy Systems **Prof. Zhenbin Zhang** *Shandong University, China*	Moli Hall (茉莉厅)
15:30-17:00	**Tutorial 3:** Model Predictive Control of AC Motor Drives **Prof. Yongchang Zhang** *North China Electric Power University, China*	Moli Hall (茉莉厅)
Chair: **Dr. Yixiao Luo** *Huazhong University of Science and Technology, China*		
14:00-15:30	**Tutorial 2:** How to Maximize the Performance of Power Electronic Systems with Finite Control Set Model Predictive Control **Prof. Petros Karamanakos** *Tampere University, Finland*	Dingxiang Hall (丁香厅)
15:30-17:00	**Tutorial 4:** Latest Advances in Robust Predictive Control of Motor Drives **Prof. S. Alireza Davari** *Shahid Rajaee University, Iran*	Dingxiang Hall (丁香厅)
Chair: **Dr. Cheng Luo** *Huazhong University of Science and Technology, China*		
14:00-17:00	**Tutorial 5:** Model Predictive Control under Disturbances: Performance, Safety, and Stability **Prof. Chuanlin Zhang** *Shanghai University of Electric Power, China* **Prof. Jun Yang** *Loughborough University, UK* **Prof. Yunda Yan** *De Montfort University, UK*	Xiantao Hall (仙桃厅)

Friday, June 16th		
17:00-19:00	Buffet Dinner	Huangli Hall, B1F, Building 2, Tingtao No.2 (听涛 2 号负一楼黄鹂厅)

Saturday, June 17th		
08:00-09:00	Registration	Convention Center Gate No.3 (会议中心 3 号门)
Opening Ceremony		
Chair: **Prof. Kai Yang** *Huazhong University of Science and Technology, China*		
09:00-09:30	**Welcome Speech** **Prof. Wei Xu, General Chair of PRECEDE 2023** *Huazhong University of Science and Technology, China* **Prof. Jian Sun, Vice President** *IEEE Power Electronics Society* **Prof. Liang Gao, Vice President** *Huazhong University of Science and Technology, China*	Qingchuan Hall (晴川厅)
09:30-09:45	Taking Photos	
Invited Talk		
Chair: **Prof. Fengxiang Wang** *Haixi Institutes, Chinese Academy of Sciences, China*		
Time	Topic	Location
09:45-10:45	**Invited Talk 1:** Latest Advances of Model Predictive Control in Electrical Drives **Prof. Jose Rodriguez** *Universidad Andres Bello, Chile* **Dr. Cristian Garcia** *University of Talca, Chile*	Qingchuan Hall (晴川厅)
10:45-11:00	Coffee Break	
Prof. Shaopeng Wu *Harbin Institute of Technology, China*		
11:00-12:00	**Invited Talk 2:** Disturbance Rejection Model Predictive Control in Mechatronic Systems **Prof. Shihua Li** *Southeast University, China*	Qingchuan Hall (晴川厅)
12:00-14:00	Lunch & Lunch Break	Huangli Hall, B1F, Building 2, Tingtao No.2 (听涛 2 号负一楼黄鹂厅)

Saturday, June 17th		
Prof. Yongchang Zhang *North China Electric Power University, China*		
14:00-15:00	**Invited Talk 3:** How Model Predictive Control is Revolutionizing the High Power Electronics Industry **Dr. Tobias Geyer** *ABB System Drives, Switzerland*	Qingchuan Hall (晴川厅)
Prof. Dong Jiang *Huazhong University of Science and Technology, China*		
15:00-16:00	**Invited Talk 4:** Model Predictive Control for Microgrids: From Power Electronic Converters to Energy Management **Prof. Josep M. Guerrero** *Aalborg University, Denmark* **Prof. Jiefeng Hu** *Federation University Australia, Australia*	Qingchuan Hall (晴川厅)
16:00-16:15	Coffee Break	
Prof. Zhenbin Zhang *Shandong University, China*		
16:15-17:15	**Invited Talk 5:** Application of Predictvie Control in Sensorless Drives **Prof. Ralph M. Kennel** *Technische Universitaet Muenchenystem, Germany* **Prof. Mohamed Abdelrahem** *Assiut University, Egypt*	Qingchuan Hall (晴川厅)
18:00-20:00	Buffet Dinner	Huangli Hall, B1F, Building 2, Tingtao No.2 (听涛 2 号负一楼黄鹂厅)

Sunday, June 18th		
Oral Presentation / Industry Session		
Time	Oral / Industry Session	Location
08:30-10:10	**Oral Session 1:** Artificial Intelligence in Predictive Control Frame Chairs: **Ping Jin, Haochen Shi**	Moli Hall (茉莉厅)
	Oral Session 2: Data-driven (Modeless) Predictive Control Techniques Chairs: **Wubin Kong, Zhen Li**	Dingxiang Hall (丁香厅)
	Oral Session 3: New Model Predictive Control Methods for Electrical Drives and Power Converters Chairs: **Chun Gan, Peng Guo**	Qianjiang Hall (潜江厅)
10:10-10:20	Coffee Break	

Sunday, June 18th		
10:20-12:00	**Oral Session 4:** Robust Predictive Control Solutions Chairs: **Dongliang Ke, Xianfei Xie**	Moli Hall (茉莉厅)
	Oral Session 5: Data-driven (Modeless) Predictive Control Techniques Chairs: **Yao Wei, Kai Ni**	Dingxiang Hall (丁香厅)
	Oral Session 6: New Model Predictive Control Methods for Electrical Drives and Power Converters Chairs: **Yu Chen, Sudan Huang**	Qianjiang Hall (潜江厅)
12:00-14:00	Lunch & Lunch Break	Huangli Hall, B1F, Building 2, Tingtao No.2 (听涛 2 号负一楼黄鹂厅)
14:00-15:40	**Oral Session 7:** Robust Predictive Control Solutions Chairs: **Jianhu Yan, Yixiao Luo**	Moli Hall (茉莉厅)
	Oral Session 8: Implementation on Issues of Model Predictive Control (e.g. FPGA, DSP, etc.)/Related Predictive Control Techniques in Renewable Energy Devices or Systems Chairs: **Zhenbin Zhang, Cheng Luo**	Dingxiang Hall (丁香厅)
	Oral Session 9: New Model Predictive Control Methods for Electrical Drives and Power Converters Chairs: **Jiaxing Lei, Haotian Xie**	Qianjiang Hall (潜江厅)
15:40-16:00	Coffee Break	
16:00-17:40	**Oral Session 10:** Robust Predictive Control Solutions Chairs: **Chunhua Liu, Senyi Liu**	Moli Hall (茉莉厅)
	Oral Session 11: Related Predictive Control Techniques in Renewable Energy Devices or Systems Chairs: **Fengxiang Wang, Leilei Guo**	Dingxiang Hall (丁香厅)

Sunday, June 18th		
	Oral Session 12: New Model Predictive Control Methods for Electrical Drives and Power Converters Chairs: **Xinhong Yu, Nan Jin**	Qianjiang Hall (潜江厅)
18:00 - 20:00	Gala Dinner & Performance	Changjiang Hall (长江厅)

Monday, June 19th		
Poster Presentation		
Time	Poster Session	Location
09:00-10:00	**Poster Session 1** Chairs: **Mingdi Fan, Donghai Zhu**	Public Area (公共区域)
	Poster Session 2 Chairs: **Wenjie Liu, Wei Sun**	
10:00-10:15	Coffee Break	
10:15-11:15	**Poster Session 3** Chairs: **Bo Wang, Yahong Chen**	Public Area (公共区域)
	Poster Session 4 Chairs: **Yi Liu, Jian Ge**	
Award Ceremony & Closing		
11:15-11:45	**Chair:** **Prof. Shihua Li** *Southeast University, China*	
12:00-14:00	Lunch & Lunch Break	Huangli Hall, B1F, Building 2, Tingtao No.2 (听涛 2 号负一楼黄鹂厅)
14:00-17:30	Technical Tour	Wuhan National High Magnetic Field Center School of Electrical and Electronic Engineering, HUST ……

Please scan the applet QR code by Wechat to obtain the latest agenda

❖ Invited Talk

Time	Paper Title & Authors
09:45-10:45	Invited Talk 1: Latest Advances of Model Predictive Control in Electrical Drives **Jose Rodriguez, Cristian Garcia**
11:00-12:00	Invited Talk 2: Disturbance Rejection Model Predictive Control in Mechatronic Systems: Performance, Safety, and Stability **Shihua Li**
14:00-15:00	Invited Talk 3: How Model Predictive Control is Revolutionizing the High Power Electronics Industry **Tobias Geyer**
15:00-16:00	Invited Talk 4: Model Predictive Control for Microgrids: From Power Electronic Converters to Energy Management **Josep M. Guerrero, Jiefeng Hu**
16:15-17:15	Invited Talk 5: Application of Predictive Control in Sensorless Drives **Ralph M. Kennel, Mohamed Abdelrahem**

◆ Invited Talk 1

Time & Place: June 17th 09:45-10:45, Qingchuan Hall(晴川厅)

Latest Advances of Model Predictive Control in Electrical Drives

Abstract:

This lecture presents what the authors consider the most relevant contributions published in the last years in the application of Model Predictive Control (MPC) in electrical drives, mainly focusing on three relevant issues: weighting factor calculation when multiple objectives are utilized in the cost function, current/torque harmonic distortion optimization when the power converter switching frequency is reduced, and robustness improvement under parameters uncertainties. Therefore, this lecture aims to enable audience to have a more precise overview while facilitating their future research work in this exciting area. The second part of this lecture is dedicated to the performance comparison of MPC with classical control techniques such as field-oriented control and direct torque control. The comparison considers the dynamic behavior of the drive and steady-state performance metrics such as inverter losses, current distortion in the motor, and acoustic noise. The main conclusion is that MPC is very competitive concerning classic control methods by reducing the inverter losses and the current distortion with comparable acoustic noise.

Jose Rodriguez

Universidad Andres Bello, Chile

Biography:

Jose Rodriguez (M'81-SM'94-F'10-LF'20) received the Engineer degree in electrical engineering from the Universidad Tecnica Federico Santa Maria, in Valparaiso, Chile, in 1977 and the Dr.-Ing. degree in electrical engineering from the University of Erlangen, Erlangen, Germany, in 1985. He has been with the Department of Electronics Engineering, Universidad Tecnica Federico Santa Maria, since 1977, where he was full Professor and President. Since 2015 he was the President and since 2019 he is full professor at Universidad Andres Bello in Santiago, Chile. He has coauthored two books, several book chapters and more than 400 journal and conference papers. His main research interests include multilevel inverters, new converter topologies, control of power converters, and adjustable-speed drives. He has received a number of best paper awards from journals of the IEEE. Dr. Rodriguez is member of the Chilean Academy of Engineering. In 2014 he received the National Award of Applied Sciences and Technology from the government of Chile. In 2015 he received the Eugene Mittelmann Award from the Industrial Electronics Society of the IEEE. In years 2014 to 2020 he has been included in the list of Highly Cited Researchers published by Web of Science.

Cristian Garcia

University of Talca, Chile

Biography:

Cristian Garcia (Senior Member, IEEE) received the M.Sc. and Ph.D. degrees in electronics engineering from the Universidad Tecnica Federico Santa Maria, Valparaiso, Chile, in 2013 and 2017, respectively. From 2017 to 2019, he was with the Engineering Faculty of the Universidad Andres Bello, Santiago, Chile, as an Assistant Professor. Since 2019, he has been with the Department of Electrical Engineering of the University of Talca, Curico, Chile, where he is currently an Assistant Professor. During 2016 he was a visiting Ph.D. student in the Power Electronics Machines and Control (PEMC) Group at the University of Nottingham, U.K.His research interests include electric transportation applications, variable-speed drives and model predictive control of power converters and drives.

◆ Invited Talk 2

Time & Place: June 17th 11:00-12:00, Qingchuan Hall(晴川厅)

Disturbance Rejection Model Predictive Control in Mechatronic Systems: Performance, Safety, and Stability

Abstract:
Provide a description of no more than 400 words.For mechatronic systems, different nonlinearities, variations of model parameters, unmodelled internal dynamics, noises, and external disturbances make control design a very challenging work. This tutorial will discuss various advanced modelling, analysis, and control techniques for mechatronic control systems, especially focusing on disturbance rejection model predictive control (DR-MPC) solutions. Compared with other high gain control, optimal control methods, and disturbance observer-based control methods, DR-MPC solutions provide a different way to deliver optimization control in the presence of disturbances and constraints, thus can effectively improve the performance of closed-loop systems and guarantee safety under extreme conditions. New research developments and results will be introduced, including performance improvement, safety-critical specification, stability, and recursive feasibility under huge changes of disturbances. Considering the characteristics of the mechatronic control system, several new MPC control schemes are presented with experimental verification results.

Shihua Li

Southeast University, China

Biography:
Shihua Li received his bachelor, master, Ph.D. degrees all in Automatic Control from Southeast University, Nanjing, China in 1995, 1998 and 2001, respectively. Since 2001, he has been with School of Automation, Southeast University, where he is a Chief Professor, Jiangsu Specially Appointed Professor. He is the chairman of IEEE IES Nanjing Chapter, Fellow of IEEE and IET. He is also the Director General of Jiangsu Association of Automation. His main research interests include modeling and nonlinear control theory with applications to mechatronic systems. He has published 3 monographs, over 300 international journal and conference papers with 25000+ citations (Google Scholar). He is one of Clarivate Analytics Highly Cited Researchers all over the world in 2017-2022. He is a winner of the 6th Nagamori Award in 2020.

◆ Invited Talk 3

Time & Place: June 17th 14:00-15:00, Qingchuan Hall(晴川厅)

How Model Predictive Control is Revolutionizing the High Power Electronics Industry

Abstract:
This lecture explores what it takes for model predictive control (MPC) to make a break-through in industry. While the low-power converter industry has been slow in adopting the most widely investigated MPC methods, MPC has started to revolutionize high-power converters by increasing their rated power, lowering their cost and ensuring their safe operation in the presence of grid disturbances and faults. In particular model predictive pulse pattern control (MP3C) fully exploits the performance potential of high-power converters by combining the benefits of MPC with the optimal steady-state performance of optimized pulse patterns. The MP3C principle can be applied to a wide range of applications, including medium-voltage drives, low-voltage traction converters, and modular multilevel converters. For load commutated inverters, model predictive torque control (MPTC) increases the drive's efficiency and robustness to grid disturbances. Both methods have been commercialized and will be discussed in detail.

Tobias Geyer

ABB System Drives, Switzerland

Biography:
Tobias Geyer is a Corporate Executive Engineer at ABB System Drives in Switzerland and R&D platform manager of the ACS6080. His research interest are high-power drives, model predictive control and optimized pulse patterns. Dr. Geyer received the Ph.D. in control theory and the Habilitation degree in power electronics from ETH Zurich. He was appointed as an extraordinary professor at Stellenbosch University in South Africa and teaches at ETH Zurich. He has received four IEEE prize paper awards and has filed about 80 patents. Dr. Geyer is a Distinguished Lecturer of PELS and a Fellow of the IEEE.

◆ Invited Talk 4

Time & Place: June 17th 15:00-16:00, Qingchuan Hall(晴川厅)

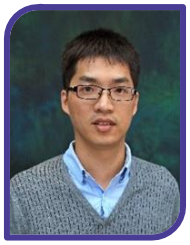
Model Predictive Control for Microgrids: From Power Electronic Converters to Energy Management

Abstract:
The existing electrical power network is going through a major transformation toward a decentralized and distributed form. Microgrids, integrated with distributed energy resources (DERs) and loads, become the building blocks of the next-generation power grid. Meanwhile, the increasing penetration of renewable energies and the associated electronic interfaces has led to new challenges in the control of microgrids. In this talk, we will review the state-of-the-art of model predictive control (MPC) in microgrids, including its applications in power converter control, energy management, as well as economic operation. In addition, major challenges and future trends of MPC in microgrids will be discussed.

Josep M. Guerrero

Aalborg University, Denmark

Biography:
Josep M. Guerrero (S'01-M'04-SM'08-FM'15) received the BSc degree in telecom engineering, MSc degree in electronics engineering, and PhD degree from the Technical University of Catalonia, Barcelona. In 2022 he received the M.Sc. Degree in Psychobiology and Cognitive Neuroscience at the Autonomous University of Barcelona.
Since 2011, he has been a Full Professor with AAU Energy, Aalborg University, Denmark, where he is responsible for the Microgrid Research Program. From 2019, he became a Villum Investigator by the Villum Fonden, which supports the Center for Research on Microgrids (CROM) at Aalborg University, being Prof. Guerrero the founder and Director of the same center (www.crom.et.aau.dk).
His research interests are oriented to different microgrid frameworks in applications like artificial intelligence, digital twins, cybersecurity, block chain and transactive energy in maritime, aerospace and space electrification, micro-bioecological systems, and smart medical systems and neuroscience, including EEG sleep brain waves analysis and large-scale brain networks.
Prof. Guerrero is an Associate Editor for several IEEE TRANSACTIONS. He has published more than 900 journal papers in the fields of microgrids and renewable energy systems, which are cited more than 90,000 times. During nine consecutive years, from 2014 to 2022, he was awarded by Clarivate Analytics as Highly Cited Researcher. In 2021, he received the IEEE Bimal Bose Award for Industrial Electronics Applications in Energy Systems, for his pioneering contributions to renewable energy based microgrids. In 2022, he received the IEEE PES Douglas M. Staszesky Distribution Automation Award, for contributions to making the hierarchical control of microgrid systems a practical reality.



Jiefeng Hu

Federation University Australia, Australia

Biography:

Dr. Jiefeng Hu received a Ph.D. degree in electrical engineering from University of Technology Sydney, Australia. He participated in the research of minigrids in Commonwealth Scientific and Industrial Research Organization, Newcastle, Australia. He was an Assistant Professor at The Hong Kong Polytechnic University, Hong Kong. Currently he is an Associate Professor and Program Coordinator of Electrical Engineering and Renewable Energy at Federation University Australia. He is also the stream leader of Centre for New Energy Transition Research (CfNETR) at Federation University Australia. His research interests include power electronics, renewable energy, and smart microgrids. He is an IEEE Senior Member and an IET Fellow. Dr. Hu serves as an associate editor/lead guest editor for prestigious journals including IET Renewable Power Generation, IEEE Transactions on Energy Conversion, and IEEE Transactions on Industrial Electronics. He is a general co-chair of 14th IEEE PES Asia-Pacific Power and Energy Engineering Conference 2022 (APPEEC) in Melbourne.

◆ Invited Talk 5

Time & Place: June 17th 16:15-17:15, Qingchuan Hall(晴川厅)

Application of Predictive Control in Sensorless Drives

Abstract:

Since around two decades predictive control is investigated in many important Research institutes. Most applications have been dealing with power electronics and electrical drives. This keynote is going to show the main differences between conventional control and model predictive control. There will be a statement, under which circumstances model predictive control has significant advantages. There will be some examples to emphasize that. Furthermore, the application of predictive control in sensorless operations of AC drives will be explained. New phase-locked loop with finite-position set is proposed to extend the principles of the finite-control-set model predictive control to the speed/position observers will be illustrated.

Ralph M. Kennel

Technische Universitaet Muenchenystem, Germany

Biography:

Ralph M. Kennel was born in 1955 at Kaiserslautern (Germany). In 1979 he got his diploma degree and in 1984 his Dr.-Ing. (Ph.D.) degree from the University of Kaiserslautern.

From 1983 to 1999 he worked on several positions with Robert BOSCH GmbH (Germany). Until 1997 he was responsible for the development of servo drives. Between 1997 and 1999 he was head of the department for predevelopment of fractional horsepower motors in automotive applications.
From 1994 to 1999 Dr. Kennel was appointed Visiting Professor at the University of Newcastle-upon-Tyne (England, UK). From 1999 - 2008 he was Professor for Electrical Machines and Drives at Wuppertal University (Germany). Since 2008 until his retirement in 2022 he was Professor for Electrical Drive systems and Power Electronics at Technische Universitaet Muenchen (Germany).
Dr. Kennel is a Senior Life Member of IEEE, a Fellow of IET (former IEE) and a Chartered Engineer in the UK. Within IEEE he was Treasurer of the Germany Section as well as Region 8 – furthermore he has been Distinguished Lecturer of the Power Electronics Society (IEEE-PELS) as well as Vice President Meetings of the same society.

Mohamed Abdelrahem

Assiut University, Egypt

Biography:

Mohamed Abdelrahem was born in Assiut, Egypt, in 1985. He received the B.Sc. (Hons.) and M.Sc. degrees in Electrical Engineering from Assiut University, Assiut in 2007 and 2011, respectively, and the Ph.D. degree (Hons.) in Electrical Engineering from the Technical University of Munich (TUM), Germany, in 2020. Since 2019, he is the head of the research group ``Renewable Energy Systems" at the Institute of High-Power Converter Systems (HLU), TUM. Since 2020, he is an Assistant Professor at the Electrical Engineering Department, Assiut University, Egypt. In 2020, Dr. Abdelrahem received Walter Gademann prize from faculty of Electrical and Computer Engineering, TUM, in recognition of his excellent PhD dissertation entitled ``Predictive Control and Finite-Set Observers for Variable-Speed Wind Generators". Furthermore, he has received a number of best paper awards from high prestigious international conferences of the IEEE. Dr. Abdelrahem is recorded in the world's top 2% scientist's list by Stanford University. He is a senior member of the IEEE. His research interests include power electronics, predictive and encoderless control of variable-speed wind generators, photovoltaic energy systems, and energy storage systems.

❖ Tutorial

Time	Paper Title & Authors
14:00-15:30	Tutorial 1: Predictive Control of Power Converters in Hybrid Micro-Energy Systems **Zhenbin Zhang**
15:30-17:00	Tutorial 3: Model Predictive Control of AC Motor Drives **Yongchang Zhang**
14:00-15:30	Tutorial 2: How to Maximize the Performance of Power Electronic Systems with Finite Control Set Model Predictive Control **Petros Karamanakos**
15:30-17:00	Tutorial 4: Latest Advances in Robust Predictive Control of Motor Drives **S. Alireza Davari**
14:00-17:00	Tutorial 5: Model Predictive Control under Disturbances: Performance, Safety, and Stability **Chuanlin Zhang, Jun Yang, Yunda Yan**

◆ Tutorial 1

Time & Place: June 16th 14:00-15:30, Moli Hall(茉莉厅)

Predictive Control of Power Converters in Hybrid Micro-Energy Systems

Instructors:
Prof. Dr.-Ing. Zhenbin Zhang, Shandong University, zbz@sud.edu.cn

Abstract:
Clean and low carbon have become more and more prominent for the future power and energy systems. To this end, increasing the penetration rate of renewable energy is the critical way to alleviate the pressure of environment. Hybrid micro-energy systems (HMESs), integrated with multiple energies as well as their generation, conversion, transmission, and consumption, are considered as the one of the key technologies with the most potential to cope with energy transition and revolution. This, coupled with the need for higher efficiency, flexibility, and reliability, has boosted the use of power converters in HMESs. In addition, with the leap improvement of computing power for real-time controllers, model predictive control (MPC) with multi-objective optimization and advance prediction characteristics has been widely used in energy, power systems and other fields. MPC has demonstrated excellent dynamic and static response, multi-objective optimization and multi-condition adaptability in various power conversion systems in different applications, especially in HMESs with a variety of energies integration and multiple control targets.
This report will focus on predictive control for power converters in HMESs, which mainly includes high-quality predictive control for single converter and cooperative predictive control for converter clusters. Furthermore, the applications, challenges and development trends of predictive control for power converters in HMESs are prospected.

Zhenbin Zhang

Shandong University, China

Biography:

Zhenbin Zhang (S'13-M'16-SM'18) received the Ph.D. degree at the Institute for Electrical Drive Systems and Power Electronics (EAL), Technical University of Munich (TUM), Germany, with "summa cum laude". From 2016 to 2017, he worked as a Research Fellow and the group-leader for "Modern Control Strategies for Electrical Drives" group in EAL. Since 2017, he has held the position of full professor and International Collaboration Ambassador of Shandong University, China. From 2018 to 2022, he was a guest professor in TUM with the "August-Wilhelm Scheer Professorship Award." In 2019, he was selected as a recipient of China's "1000-Talent-Plan". In 2020, he was appointed as the director for "International Joint Center for Intelligent Energy and Advanced Energy Conversion Systems". In 2022, he was also elected as IET Fellow.

Dr. Zhang is a recipient of the VDE-Award, Germany. He has authored 2 monographs and more than 160 papers. He has also made several invited presentations at international conferences and seminars. In addition, he was elected the general chair of IEEE-PRECEDE-2021 conference, and Associate Editor of IEEE TRANSACTIONS ON POWER ELECTRONICS. His research interests include power electronics and electrical drives, sustainable energy systems, smart- and microgrids.

◆ Tutorial 2

Time & Place: June 16th 14:00-15:30, Dingxiang Hall(丁香厅)

How to Maximize the Performance of Power Electronic Systems with Finite Control Set Model Predictive Control

Instructors:

Petros Karamanakos, Faculty of Information Technology and Communication Sciences, Tampere University, 33101 Tampere, Finland; e-mail: p.karamanakos@ieee.org

Abstract:

Finite control set model predictive control (FCS-MPC) has gained significant attention in recent years, mainly from the academic community. Industry, nevertheless, is reluctant to adopt new control methods that do not provide significant economic benefits. To achieve these benefits with control, it is mandatory to improve some key aspects of the power electronic system performance.

This tutorial discusses and analyzes the factors that affect the closed-loop performance of FCS-MPC. Based on these findings, design guidelines are provided that help to maximize the power electronic system performance, and thus achieve superior performance compared with conventional control techniques. The tutorial concludes with a critical assessment of the performance based on two case studies. Overall, the tutorial aims at providing a balanced mix of theory and application-related material. Special care is taken to ensure that the presented material is intuitively accessible to the power electronics

practitioner. This is achieved by augmenting the mathematical formulations by illustrations and simple examples.

By the end of the tutorial, the attendees:

- will have a new insight on the design of FCS-MPC-based controllers,
- will be able to understand what design options exist that maximize the system performance, and
- will be able to design FCS-MPC-based controllers that outperform conventional control techniques and push the system performance to its physical limits.

Petros Karamanakos

Tampere University, Finland

Biography:

Petros Karamanakos is an Associate Professor at the Faculty of Information Technology and Communication Sciences, Tampere University, Tampere, Finland. Dr. Karamanakos received the Diploma and the Ph.D. degrees in electrical and computer engineering from the National Technical University of Athens (NTUA), Athens, Greece, in 2007, and 2013, respectively.

Prior to joining Tampere University, he was with the ABB Corporate Research Center, Baden-Dättwil, Switzerland, and the Chair of Electrical Drive Systems and Power Electronics, Technische Universität München, Munich, Germany. His main research interests lie at the intersection of optimal control and modulation, mathematical programming and power electronics, including model predictive control for utility-scale power converters and ac variable speed drives.

Dr. Karamanakos has received three IEEE prize paper awards. He serves as an Associate Editor of the IEEE Transactions on Industry Applications and of the IEEE Open Journal of Industry Applications. Dr. Karamanakos is a Regional Distinguished Lecturer of the IEEE Power Electronics Society and an IEEE Senior Member.

◆ Tutorial 3

Time & Place: June 16th 15:30-17:00, Moli Hall(茉莉厅)

Model Predictive Control of AC Motor Drives

Instructors:

Yongchang Zhang, North China Electric Power University, zyc@ncepu.edu.cn

Abstract:

Model predictive control (MPC) has attracted increasing attention in the area of ac motor drives due to its simple concept, fast transient response, and flexibility in incorporating various constraints. Hence, MPC is considered as a powerful and attractive alternative to the conventional FOC and DTC. However, MPC has not yet reached a mature stage for industrial applications. Many aspects, e.g., steady state performance improvement, weighting factor tuning, reduction of computational burden, robustness against parameter mismatches, etc. need to be further investigated. This tutorial takes the ac motor drive

as an example and shows that how these problems in MPC are solved. The methodology and techniqe introduced in this tutorial can be extended to various kinds of ac machines and power converters.

Yongchang Zhang

North China Electric Power University, China

Biography:

Yongchang Zhang received the B.S. degree from Chongqing University, China, in 2004 and the Ph.D. degree from Tsinghua University, China, in 2009, both in electrical engineering.

From August 2009 to August 2011, he was a Postdoctoral Fellow at the University of Technology Sydney, Australia. He joined North China University of Technology in August 2011 as an associate professor, and was promoted to a full professor in January 2015. Since July 2021, he is a full professor at North China Electric Power University. He has published more than 100 technical papers in the area of motor drives, pulsewidth modulation and AC/DC converters. His current research interest is model predictive control for power converters and motor drives.

Dr. Zhang is a fellow of the Institute of Engineering and Technology. He serves as the associate/guest editor of several international journals, such as IEEE Journal of Emerging and Selected Topics in Power Electronics. He is the Technical Program Co-Chair of 5th, 6th and 7th IEEE International Conference on Predictive Control of Electrical Drives and Power Electronics.

◆ Tutorial 4

Time & Place: June 16th 15:30-17:00, Dingxiang Hall(丁香厅)

Latest Advances in Robust Predictive Control of Motor Drives

Instructors:

Dr. S. Alireza Davari, Shahid Rajaee University, davari@sru.ac.ir

Abstract:

Predictive control has become a flexible and accurate technique in different power electronics applications including the motor drive. Despite various benefits, there are still challenges to using this method in motor drives. An important dispute about model predictive control is the dependency of the method on the load model. When it comes to motor drives application the model includes more uncertainties and more variations. There are two types of uncertainties in motor drives. 1) The parameter mismatch includes any change or variation in the electric or magnetic parameters of the motor or the inverter. For example, stator resistance increases when the motor gets warm. The core saturation is another example. 2) The operating point includes any change in the torque or the speed of the motor. Load disturbance is an example of this category.

There are various cases of research to improve the robustness of predictive control. There are two general methods to reach this goal. The first technique is based on adaptive model application. This method updates the uncertain parameters during the performance of the system by using adaptive estimation. This

method keeps the original model of the motor and inverter and corrects it when the motor is running.
The second approach completely abandons the classic model of the motor and uses a new model called the local model. This technique is known as model-free predictive control in the literature. In this way, the prediction model will not be the classical model of the motor. The local model plays the role of the prediction motor to select the optimum switching state of the inverter. The mathematics of the local model could consist of two concepts. The first kind of the local model is an iterative numerical model. This method uses the previously gathered data to predict future data. The second kind is a disturbance observer. A compact model of the motor in which all uncertainties are lumped into a new parameter as the disturbance. The method applied an observer to estimate the disturbance.
This tutorial will explain different types of robust predictive control in drives applications. A comprehensive comparison will be the conclusion of the tutorial.

S. Alireza Davari

Shahid Rajaee University, Iran

Biography:
S. Alireza Davari received the M.Sc. and Ph.D. degrees both from the Iran University of Science and Technology (IUST), Tehran, Iran, in 2006 and 2012, respectively. Between 2010 and 2011, he left for a sabbatical visit at Technische Universitaet Muenchen, Germany. Between 2013 and 2020, he was at Shahid Rajaee Teacher Training University as an Assistant Professor. Since 2020 he has continued at the same university as an Associate Professor. He was a visiting research professor at Universidad Andres Bello from 2022 to 2023. His research interests include encoder-less drives, predictive control, power electronics, and renewable energy.

◆ Tutorial 5

Time & Place: June 16th 14:00-17:00, Xiantao Hall(仙桃厅)

Model Predictive Control under Disturbances: Performance, Safety, and Stability

Instructors:
Chuanlin Zhang, College of Automation Engineering, Shanghai University of Electric Power, clzhang@shiep.edu.cn
Jun Yang, Department of Aeronautical and Automotive Engineering, Loughborough University, j.yang3@lboro.ac.uk
Yunda Yan, School of Engineering and Sustainable Development, De Montfort University, yunda.yan@dmu.ac.uk

Abstract:
Provide a description of no more than 400 words.For mechatronic systems, different nonlinearities, variations of model parameters, unmodelled internal dynamics, noises, and external disturbances make control design a very challenging work. This tutorial will discuss various advanced modelling, analysis,

and control techniques for mechatronic control systems, especially focusing on disturbance rejection model predictive control (DR-MPC) solutions. Compared with other high gain control, optimal control methods, and disturbance observer-based control methods, DR-MPC solutions provide a different way to deliver optimization control in the presence of disturbances and constraints, thus can effectively improve the performance of closed-loop systems and guarantee safety under extreme conditions. New research developments and results will be introduced, including performance improvement, safety-critical specification, stability, and recursive feasibility under huge changes of disturbances. Considering the characteristics of the mechatronic control system, several new MPC control schemes are presented with experimental verification results.

Chuanlin Zhang

Shanghai University of Electric Power, China

Biography:

Chuanlin Zhang is the executive dean of College of Computer Science and Technology, Shanghai University of Electric Power. He received the B.S. degree in mathematics and the Ph.D. degree in control theory and control engineering from the School of Automation, Southeast University, Nanjing, China, in 2008 and 2014, respectively. He was a Visiting Ph.D. Student with the Department of Electrical and Computer Engineering, University of Texas at San Antonio, USA, from 2011 to 2012; a Visiting Scholar with the Energy Research Institute, Nanyang Technological University, Singapore, from 2016 to 2017. a Visiting Scholar with the Advanced Robotic Center, National University of Singapore, from 2017 to 2018. His research interests include nonlinear system control theory and applications for distributed power systems and intelligent autonomous systems. He has authored more than 70 SCI indexed papers, in which over 30 papers publicated in IEEE Transaction series. He has hold a number of scientific research projects such as the National Natural Science Foundation of China, Shanghai Rising-Star Program, and Shanghai Natural Science Foundation. Currently, he is a Distinguished Professor of Oriental Scholars at Shanghai, Executive Director of the IEEE PES Smart Grid and New Technology (China) Intelligent IoT and Control Technology Subcommittee, Deputy Director of the Academic Committee of Shanghai Electronics and Electrical Appliances Association, Director of Shanghai Automation Society, and Senior Member of IEEE.

Jun Yang

Loughborough University, UK

Biography:

Jun Yang is a Senior Lecturer in Electric and Autonomous Vehicles at Loughborough University. He has been engaged in nonlinear and intelligent disturbance rejection control theory, and autonomous system theory with applications to intelligent mechatronic and robotic systems. He was elevated as an IEEE

Fellow in 2022 and an IET Fellow in 2020. He is the recipient of EPSRC New Investigator Award in 2022, the Winner of Gold Medal of International Exhibition of Inventions of Geneva in 2022, Premium Award for best paper of IET Control Theory and Applications in 2017, ICI Prize for best paper of Transactions of the Institute of Measurement and Control in 2016. He has published a monograph and more than 100 journal papers, which have gained over 11,000 citations on Google Scholars. He serves as Associate/Technical Editors of prestigious international journals like IEEE Transactions on Industrial Electronics, IEEE/ASME Transactions on Mechatronics, IEEE Open Journal of Industrial Electronics Society, etc.

Yunda Yan

De Montfort University, UK

Biography:

Yunda Yan is a Lecturer in Control Engineering at the School of Engineering and Sustainable Development, De Montfort University (DMU), UK. He received a PhD degree in Control Science and Engineering from Southeast University, China, in 2019, and a BEng degree in Automation from Southeast University in 2013. Prior to joining DMU, he worked as a post-doctoral researcher at the Centre of Autonomous Systems, Loughborough University, UK, from Jun. 2020 to Dec. 2022. At Loughborough University, he worked on several projects related to manufacturing, aerial robotics, and optimization-based control. His current research focuses on the safety-critical control design for autonomous systems, especially related to optimization and learning-based methods. He is particularly interested in developing fundamental methods and algorithms that embedding or enhancing the safety of autonomous systems in complex real-world environments with unknown or uncertain disturbances.

❖ Oral Session

◆ Oral Session 1

Time: June 18th 08:30-10:10
Place: Moli Hall (茉莉厅)
Topic: Artificial Intelligence in Predictive Control Frame
Session Chairs: Ping Jin, Haochen Shi

Time	Paper ID	Paper Title & Authors
08:30-08:50	742	Model Predictive Control of Current Source Inverter for PMSM Drive **Kun Qian, Yiguo Xu, Mingdi Fan, Haoran Wang, Yong Yang**
08:50-09:10	588	Data-Driven Based Hybrid Predictive Model for the PMSM Drive System **Taoming Wang, Jing Wang, Wenqing Guan, Chunqiang Liu, Yifei Chen, Zhe Chen, Guangzhao Luo**
09:10-09:30	607	Fault Diagnosis of Current Sensor in Grid-Connected Inverter Based on Sliding Mode Observer **Yanyan Li, Yingxun Xia, Leilei Guo, Nan Jin**
09:30-09:50	734	Time-Delay Identification of PMLSM Control System based on RNN Observer **Song Lin, Ziling Nie, Jun Sun, Huayu Li, Zhentian Liu**
09:50-10:10	722	Composite Block Backstepping for Micro Gas Turbine System with Mismatched Disturbances **Fubao Wu, Long Zhang, Ning Chen, Zuo Wang**

◆ Oral Session 2

Time: June 18th 08:30-10:10
Place: Dingxiang Hall (丁香厅)
Topic: Data-Driven (Modeless) Predictive Control Techniques
Session Chairs: Wubin Kong, Zhen Li

Time	Paper ID	Paper Title & Authors
08:30-08:50	741	An Efficient FCS-MPC Using Virtual Voltage Vectors for Three-Phase T-Type Inverters **Renji Mo, Yong Yang, Youcheng Wang, Shengwei Chen, Mingqi Gong, Aiming Ji**
08:50-09:10	564	ARMA-Based Model-Free Two-Degree-of-Freedom Predictive Control Strategy for SPMSM Drives **Yao Wei, Dongliang Ke, Hector Young, Fengxiang Wang, Jose Rodriguez**

Time	Paper ID	Paper Title & Authors
09:10-09:30	686	Model-Free Predictive Control: A Method to Always Improve the Performance Robustness of Power Electronic Systems **Yuhan Zhang, Wanrong Li, Huawei Yuan, Jianguo Zhu, Sinan Li**
09:30-09:50	592 (Online)	Data-Driven Predictive Control with Inherent Update Method for Two-Level Voltage Source Inverters **Paul Gistain Ipoum Ngome, Daniel Mon-Nzongo, Chunyan Lai, Tao Jin, Jinquan Tang, Jose Rodriguez**
09:50-10:10	641	An Improved Extended State Observer Based Model-Free Predictive Current Control for Open-Winding Permanent Magnet Linear Synchronous Motor Drives **Rong Feng, ChenWei Ma, Jose Rodriguez, Cristian Garcia, WenSheng Song**

◆ Oral Session 3

Time: June 18th 08:30-10:10
Place: Qianjiang Hall (潜江厅)
Topic: New Model Predictive Control (MPC) Methods for Electrical Drives and Power Converters
Session Chairs: Chun Gan, Peng Guo

Time	Paper ID	Paper Title & Authors
08:30-08:50	628	An Improved FCS-MPC Algorithm for Three-Phase Three-Level T-Type Grid-Connected Inverters with Sector Optimization and Secondary Judgment **Mingqi Gong, Yong Yang, Yi Zhu, Shengwei Chen, Youcheng Wang, Renji Mo**
08:50-09:10	582	An Enhanced Deadbeat Model Predivtive Flux Control for PMSMs with A Reduced Order Disturbance Observer **Mengfei Wei, Chi Zhang, Xu Qiao**
09:10-09:30	576	Speed Sensorless Control of Induction Motor Based on A New Optimal Iteration Algorithm **Leilei Guo, Xueyan Jin, Yanyan Li, Shuai Wang, Nan Jin**
09:30-09:50	679	Sensorless Control of IPMSM Based on Current Prediction and Nonlinear Flux Model **Bochao Du, Kai Yao, Shaopeng Wu, Qianfan Zhang**
09:50-10:10	733	Low-Computation Burden Model Predictive Current Control for PMSM Drives Based on Cartesian Distance Minimization **Song Lin, Ziling Nie, Jun Sun, Meihe Cao, Huayu Li**

◆ Oral Session 4

Time: June 18th 10:20-12:00
Place: Moli Hall (茉莉厅)
Topic: Robust Predictive Control Solutions
Session Chairs: Dongliang Ke, Xianfei Xie

Time	Paper ID	Paper Title & Authors
10:20-10:40	699	Robust Deadbeat Finite-Set Predictive Torque and Flux Control for PMSM with Dynamic Model **Taoming Wang, Lijun Chen, Mengbo Zhang, Xi Xiao, Zhe Chen, Guangzhao Luo**
10:40-11:00	--	Industrial Motor Test Solutions of ITECH **Yuxiao Zhou**
11:00-11:20	634	Prediction Current Control Strategy Based on Sliding Mode for NPC Three-level LCL Inverter **Guojiao Li, Guofeng He, Shicheng Zheng, Zichun Zhou, Guanxu Chen**
11:20-11:40	662	Online Inductance Identification Based-Robust Model Predictive Current Control for PMSM Drives **Aoyang Xu, Haitao Yang, Min Li**
11:40-12:00	697	Model Predictive Torque Control of SRMs with Current Reconstruction for Split-DC Power Converters **Lefei Ge, Jixuan Guo**

◆ Oral Session 5

Time: June 18th 10:20-12:00
Place: Dingxiang Hall (丁香厅)
Topic: Data-Driven (Modeless) Predictive Control Techniques
Session Chairs: Yao Wei, Kai Ni

Time	Paper ID	Paper Title & Authors
10:20-10:40	631	Model-Free Predictive Current Control of PMSM Drives Using Recursive Least Squares Algorithm **Xiaonan Gao, Yuebin Pang, Wei Tian, Dehao Kong, José Rodríguez, Ralph Kennel**
10:40-11:00	2 (Online)	Two-step Model-Free Predictive Current Control for PMSM **Yaohua Li, Zikun Liu, Tingxu Wu, Ruiqi Tong, Xinquan Zhang, Yizhi Deng**

Time	Paper ID	Paper Title & Authors
11:00-11:20	708	Comparison Analysis on Control-Increment-Based and Control-Quantity-Based Predictive Controls of Permanent Magnet Synchronous Motors **Lei Ling, Su-Dan Huang, Guang-Zhong Cao, Hong Qiu**
11:20-11:40	654	Data-Driven Finite-Set Predictive Current Control via Deep Q-Learning for Permanent Magnet Synchronous Motor Drives **Zichun Tang, Chenwei Ma, Jose Rodriguez, Cristian Garcia, Wensheng Song**
11:40-12:00	685	A NARX Neural Network-Based Predictive Control for Power Management of DC Microgrid Clusters **Jixiang Diao, Sucheng Liu, Xuefeng Huang, Qianjin Zhang, Wei Fang, Xiaodong Liu**

◆ Oral Session 6

Time: June 18th 10:20-12:00
Place: Qianjiang Hall (潜江厅)
Topic: New Model Predictive Control (MPC) Methods for Electrical Drives and Power Converters
Session Chairs: Yu Chen, Sudan Huang

Time	Paper ID	Paper Title & Author
10:20-10:40	639	Synchronized SVPWM With Half-Wave Symmetry Relaxation for Low-Switching-Frequency Three-Level NPC Inverter **Wenyue Zheng, Yongchang Zhang, Yubin Wang**
10:40-11:00	750	Multi-Step Predictive Control Based on Ant Colony Optimization for Offshore Wind Turbine System **Kaige Zhang, Zhen Li, Han He, Meng Wang, Zhenbin Zhang, Jose Rodriguez**
11:00-11:20	6 (Online)	Model Predictive Current Control for Permanent Magnet Synchronous Motor Based on Neural Network **Yaohua Li, Dongmei Liu, Tingxu Wu, Weichao Guo, Xinquan Zhang, Yizhi Deng**
11:20-11:40	678	Finite Control Set Model Free Predictive Current Control of Permanent Magnet Synchronous Motors **Yanqing Zhang, Liang Shao, Zhonggang Yin, Yanping Zhang, Peien Luo**

Time	Paper ID	Paper Title & Author
11:40-12:00	595 (Online)	ABC Frame Model-Free Predictive Control for Multiphase Converters and Electrical Drives **Mahdi S. Mousavi, S. Alireza Davari, Freddy Flores-Bahamonde, Cristian Garcia, Jose Rodriguez**

◆ Oral Session 7

Time: June 18th 14:00-15:40
Place: Moli Hall (茉莉厅)
Topic: Robust Predictive Control Solutions
Session Chairs: Jianhu Yan, Yixiao Luo

Time	Paper ID	Paper Title & Author
14:00-14:20	683	Robust Deadbeat Predictive Current Control Based on Adaptive Internal Model Disturbance Observer for PMLSM Drives **Cong Bai, Zhonggang Yin, Dongsheng Yuan, Yanqing Zhang, Yangyang Cui**
14:20-14:40	637 (Online)	Multi-Objective Control of Nine-Level ANPC Converters: A Robust and Gain-Free MPC Method **Ibrahim Harbi, Hamza Makhamreh, Mostafa Ahmed, Mohamed Abdelrahem, Marcelo Heldwein, Jose Rodriguez, Ralph Kennel**
14:40-15:00	598	Model-Free Predictive Current Control for Three-Phase AC/DC Converters Based on Hybrid SVM to Minimize Current Harmonics **Lei Han, Yongchang Zhang, Xing Wang, Na Jia, Xiaoyi Zhu**
15:00-15:20	716	Safe State Estimation with Disturbance Rejection in PMSM Systems **Dongqing Liu, Jun Yang, Shihua Li**
15:20-15:40	--	Design of Single-Sided Linear Induction Motor for Low-Speed Maglev Vehicle in 160 km/h and Variable Slip Frequency Control **Yunfeng He**

◆ Oral Session 8

Time: June 18th 14:00-15:40
Place: Dingxiang Hall (丁香厅)
Topic: Implementation on Issues of MPC (e.g. FPGA, DSP, etc.)/Related Predictive Control Techniques in Renewable Energy Devices or Systems
Session Chairs: Zhenbin Zhang, Cheng Luo

Time	Paper ID	Paper Title & Author
14:00-14:20	609	Model Predictive Voltage Control Cascaded Adaptive Droop Method for Three-Level Micro Power Inverter in Islanding Operation **Xinhong Yu, Jiayi Kang, Dongxiao Huang, Anjun Xia, Fengxiang Wang, Jose Rodriguez**
14:20-14:40	643	MotorAST: A Low-Cost High-Performance Rapid Control Prototype Platform for Electric Drives **Yeyuan Zhu, Yongchang Zhang, Jian Kang, Xing Wang**
14:40-15:00	652	Cascaded Deadbeat Predictive Power Control for High-speed PMSG under Wide Speed Range **Meng Wang, Liyi Li, Jiaxi Liu, Aiguo Zhang, Yongjie Guo**
15:00-15:20	691	Event-Triggered Predictive Function Control of DC Microgrid Clusters **Taohu Zhou, Sucheng Liu, Jixiang Diao, Qianjin Zhang, Wei Fang, Xiaodong Liu**
15:20-15:40	709	Model-Predictive-Control-Based Speed Control Strategies of Permanent Magnet Synchronous Motors **Rongsheng Lin, Su-dan Huang, Guang-zhong Cao, Chao Wu**

◆ Oral Session 9

Time: June 18th 14:00-15:40
Place: Qianjiang Hall (潜江厅)
Topic: New Model Predictive Control (MPC) Methods for Electrical Drives and Power Converters
Session Chairs: Jiaxing Lei, Haotian Xie

Time	Paper ID	Paper Title & Author
14:00-14:20	727	Disturbance Observer Based MPC for PMSM with Multiple Disturbances **Haifeng Li, Shihua Li, Yunda Yan**
14:20-14:40	655	Model Predictive Current Control for Three-Level Inverter-Fed PMSM Drives Based on Variable Sequence Space Vector Modulation **Yubin Wang, Yongchang Zhang, Wenyue Zheng**

Time	Paper ID	Paper Title & Author
14:40-15:00	591	Low-Complexity Three-Vector Based Model Predictive Flux Control for Induction Motors **Huiqing Song, Tao Jin, Paul Gistain Ipoum-Ngome, Jinquan Tang, Daniel Legrand Mon-Nzongo, Jose Rodriguez**
15:00-15:20	622 (Online)	Model Predictive Control of PMSM with Computed Torque for Servo Press **Qi Li, Yan Lv, Ralph Kennel, Jose Rodriguez**
15:20-15:40	601	An Improved SVM-based Optimal Duty Cycle Model Predictive Current Control for PMSM **Xiangcheng Li, Yong Yang, Jun Sun, Yang Xiao, Mingdi Fan**

◆ Oral Session 10

Time: June 18th 16:00-17:40
Place: Moli Hall (茉莉厅)
Topic: Robust Predictive Control Solutions
Session Chairs: Chunhua Liu, Senyi Liu

Time	Paper ID	Paper Title & Author
16:00-16:20	670	An Improved Model-Free Predictive Power Control for Three-phase Grid-Connected Inverter Based on Hybrid SVM under Unbalanced Grids **Xing Wang, Yongchang Zhang, Lei Han, Na Jia, Xiaoyi Zhu**
16:20-16:40	669 (Online)	Model-Free Predictive Current Control of PMSM Based on Maximum Torque per Ampere **Xudong Guo, Paul Gistain Ipoum-Ngome, Daniel legrand Mon-Nzongo, Jinquan Tang, Jose Rodriguez, Tao Jin**
16:40-17:00	664	A Model Parameter-Less Predictive Current Control Method for Synchronous Reluctance Motor Drives **Qiushi Wang, Haitao Yang**
17:00-17:20	608	Non-Cascaded Model-Free Predictive Direct Voltage Control of Three-phase Vienna Rectifier **Xinhong Yu, Ziyu Cai, Dongliang Ke, Fengxiang Wang, Jose Rodriguez, Marcelo Lobo Heldwein**
17:20-17:40	616	Algebraic Estimator Based Model-Free Predictive Control for Interleaved Buck Converter Using Composite Simpson Rule **Libin Xu, Xinhong Yu, Dongliang Ke, Fengxiang Wang, Jose Rodriguez, Marcelo Lobo Heldwein**

◆ Oral Session 11

Time: June 18th 16:00-17:40
Place: Dingxiang Hall (丁香厅)
Topic: Related Predictive Control Techniques in Renewable Energy Devices or Systems
Session Chairs: Fengxiang Wang, Leilei Guo

Time	Paper ID	Paper Title & Author
16:00-16:20	619 (Online)	Highly Efficient MPPT Technique Using Model Predictive Control **Mostafa Ahmed, Ibrahim Harbi, Mohamed Abdelrahem, Jose Rodriguez, Ralph Kennel**
16:20-16:40	569 (Online)	Finite-Set Model Predictive Control for 17-Level Inverter with Reduced Number of Iterations in Photovoltaic Applications **Mohamed Abdelrahem, Ibrahim Harbi, Mostafa Ahmed, M. Saad Bin Arif, Ralph Kennel, Jose Rodriguez**
16:40-17:00	705	A Two-Step Modulated Model Predictive Control Scheme for the MMC-Based Battery Energy Storage System with SOH Balancing Ability **Haolin Yu, Qian Xiao, Yu Jin, Yunfei Mu, Wenhua Li, Fayou Yan, Shiqi Guo, Hongjie Jia**
17:00-17:20	625	Robust Cooperative Predictive Control of DC Microgrids with Constant Power Loads **Hao Zhang, Zhen Li, Yafei Yin, Meng Wang, Qianli Xing, Zhiqian Zhang, Qi Wang, Zhenbin Zhang**
17:20-17:40	701	An Adaptive Virtual Synchronous Generator Based Model Predictive Control with Enhanced Frequency Support Capability in Micro-Energy Systems **Zhiqian Zhang, Zhen Li, Hao Zhang, Qi Wang, Zhenbin Zhang, Jose Rodriguez, Hui Shi**

◆ Oral Session 12

Time: June 18th 16:00-17:40
Place: Qianjiang Hall (潜江厅)
Topic: New Model Predictive Control (MPC) Methods for Electrical Drives and Power Converters
Session Chairs: Xinhong Yu, Nan Jin

Time	Paper ID	Paper Title & Author
16:00-16:20	624	Multi-Virtual-Vector-Based Predictive Current Control for Fault-Tolerant Inverter-Fed Dual Three-Phase Permanent Magnet Synchronous Machines **Ze Li, Jinhui Xia, Xiaonan Gao, Jose Rodriguez, Yuanbo Guo, Xiaohua Zhang**
16:20-16:40	737	Disturbance Observer Enhanced Predictive Current Control for the Switched Reluctance Motor **Minrui Li, Jinya Su, Shihua Li**
16:40-17:00	735	An Efficient Dynamic Sequential Predictive Control of Module Multilevel Power Converters **Junda Li, Zhenbin Zhang, Yuanxiang Sun, Jose Rodriguez**
17:00-17:20	570	Finite-Set Model Predictive Current Control for Variable-Flux Memory Machine Drives with a Three-Stage Optimization Strategy **Xing Liu, Hui Yang, Heyun Lin, Feng Yu, Hanlin Zhan, Chaohui Liu**
17:20-17:40	584	Improved Finite Position Set-Phase Locked Loop for Sensorless Control of PMSM Drives **Jian Huang, Haichuan Niu, Zhixun Ma, Xu Zhang**

❖ Poster Session

◆ Poster Session 1

Time: June 19th 09:00-10:00
Place: Public Area (公共区域)
Session Chairs: Mingdi Fan, Donghai Zhu

Paper ID	Paper Title & Authors
702 (Online)	Indirect Model Predictive Control Scheme with Highly-reduced Computational Burden for Three-phase MMC **Mahyar Khosravi, Davood Arab Khaburi, Meysam Yousefzadeh, Jose Rodriguez**
629	An Effective Model-Free Predictive Control for LC-Filter Voltage Source Inverters **Zheng Yin, Cungang Hu, Tao Rui, Wenping Cao, Zhuangzhuang Feng, Geye Lu**
633	Robust Predictive Current Control with Online Multi-Step Disturbance Compensation for Three-level Inverter-Fed PMSM **Zhehan Ke, Yuxuan Chen, Dongliang Ke, Fengxiang Wang, Jose Rodriguez, Marcelo Lobo Heldwein**
640	Two-Vector Model Predictive Control of Permanent Magnet Synchronous Motor Based on Sliding Mode Control **Shengze Wei, Feng Yang, Mingmao Hu, Wang Yuan**
656	A Hybrid PI-FOC and CCS-MPC Method for Multiple Harmonic Current Suppression in Multiphase Machines **Shusen Ni, Zedong Zheng, Yongdong Li, Ling Peng**
666	A Novel Hybrid Model Predictive Control for Open Winding PMSM Considering Dead-Zone Effect **Xiaoguang Zhang, Yuanhang Cao, Chenguang Zhang**
682 (Online)	A Modified Modulated Model Predictive Control for PMSM in Over-Modulation Region **Qinghua Dong, Yong Yu, Bo Wang, Minghe Tian, Dianguo Xu**
687	Robust Model Predictive Current Control with Adaptive Extended-State-Observer for Permanent Magnet Synchronous Motor **Feifan Li, Ze Li, Xiaohua Zhang, Yuanbo Guo**
690	An Improved Label Dataset Generation Method of Neural Network Based Finite Set Model Predictive Control for Two-Level Grid Connected Converter **Guoyuan Liu, Liang Chen, Shuai Zhao, Zemin Pan, Zhuoyi Chen**

Paper ID	Paper Title & Authors
693	Automatically Tuning of Weighting Factors for FCS-MPC in PMSM Drives Using Lightweight Neural Network **Chunxing Yao, Shuai Xu, Zhenyao Sun, Guanzhou Ren, Guohua Li, Guangtong Xu**
627	Model Predictive Control Strategy Design for the Electromechanical Servo System Considering Multi-Disturbance **Chaohui Liu, Qian Zhang, Quan Zhou, Heng Yang, Menghu Fu, Jinxing Song, Qianqian Ma**
563	Model Free Predictive Current Control for Voltage Source Inverter Using Luenberger Observer **Hongru Fan, Zhipeng Li, Zhengmao Li, Jose Rodriguez, Benfei Wang**
688 (Online)	Long-Horizon Robust Direct Model Predictive Control for Medium-Voltage Drives with Active Neutral-Point Potential Balancing **Andrei Tregubov, Petros Karamanakos, Ludovico Ortombina**
596	Cascade Finite Control Set Model-Free Predictive Control for Permanent Magnet Synchronous Motor **Zheng Sun, Yongting Deng, Jianli Wang, Haiyang Cao**
711	Finite Control Set Model-Free Predictive Current Control Based on Modified Voltage Vector and Finite-time Disturbance Observer for PMSM Drives **Tian Yang, Yongting Deng, Hongwen Li, Jianli Wang, Xiufeng Liu**
672	Current Sampling Scheme for Finite-Control-Set Model Predictive Control of PMSM Drives with Two Shunt Resistors **Zhuoyi Chen, Liang Chen, Jianqi Qiu, Li Shi, Donglian Qi**
721	Efficiency Optimization Based Predictive Thrust and Flux Control for Three-Level Inverter-Fed Linear Induction Machine Adapted to Urban Transit **Yirong Tang, Wei Xu, Jian Ge, Yongdao Shangguan, Yi Liu, Kaiju Liao**
577	A Novel Constrained Model Predictive Position Control for PMSM Drives **Shaobin Li, Yongxiang Xu, Jibin Zou**
718	An improved linear extended state observer-based model predictive current control for variable flux memory machine for underwater-aerial unmanned aerial vehicle applications **Dunwei Lv, Hui Yang, Xing Liu, Heyun Lin, Cheng Qian, Junquan Chen, Nan Lin**

◆ Poster Session 2

Time: June 19th 09:00-10:00
Place: Public Area (公共区域)
Session Chairs: Wenjie Liu, Wei Sun

Paper ID	Paper Title & Authors
638	Torque-Ripple Suppression Strategy for a New Double Stator Switched Reluctance Motor Based on Predictive Control **Wenju Yan, Dong Zhang, Kun Zhang, Hao Chen, Weichao Wang, Hailong Li**
648	Alternating Sequential Model Predictive Control of Permanent Magnet Synchronous Machine **Yan Yu, Jianwei Zhang, Guizhen Tian, Guangchen Liu**
736	Multi-Time Scale Energy Management Strategy Based on MPC for 5G Base Stations Considering Backup Energy Storage and Air Conditioning **Ting Ding, Junhua Wang, Jose Matas, Josep M. Guerrero, Ruixun Qiao, Chenlu Wang**
604	Long Prediction Horizon Multi-Objective FS-MPC without Weighting Factors **Haotian Xie, Fengxiang Wang, Jose Rodriguez, Ralph Kennel, Marcelo Heldwein**
605	Comparisons of FCS-MPC Schemes and Conventional PI-based Methods for Electrical Drive Systems **Haotian Xie, Fengxiang Wang, Jose Rodriguez, Ralph Kennel, Marcelo Heldwein**
707	Cascaded Model Predictive Control for the Ferrite-Assisted Synchronous Reluctance Motor with Asymmetric Rotor Structure **Longxuan Li, Wenliang Zhao, Hao Wu, Cong Liu**
744	Improved Two-Vector-Based Model Predictive Current Control for Doubly Salient Electromagnetic Machine **Xingwei Zhou, Minhui Zhan, Peixin Liu, Shuangxia Niu, Zhao Tian, Li Zhang**
5	Robust Model Predictive Current Control of Permanent Magnet Synchronous Motor Based on Local Model Observer **Xiaobao Yang, Bo Luo, Mingxian Li, Yu Zhou, Ke Liu, Yuyong Zhu**
647	A New Dimension Elimination Method and Robustness Research of Model Predictive Thrust Control of Linear Induction Motor Driven by Three-level Inverter **Dongyi Li, Wei Xu, Yirong Tang, Siwei Cheng**
610	An Improved Triple-Vector Modulated Model Predictive Control Method for Permanent Magnet Synchronous Motor **Dong Liu, Wei Xu, Han Xiao, Pu Zhong, Leilei Guo**

Paper ID	Paper Title & Authors
613 (Online)	Predictive Position Control for PMSM Drives with Speed and Current Constraints **Chun He, Jianhui Hu, Yong Li**
617 (Online)	Indirect Model Predictive Control of Flywheel Energy Storage System Based on Matrix Converter **Jianwei Zhang, Yunhui Wang, Yan Yu, Sufang Wen, Guangchen Liu**
635 (Online)	Fault-Tolerant Model Predictive Control for Interturn Short Circuit Faults in Symmetrical Six-Phase PMSMs **Huidong Wang, Jianhui Hu, Yong Li**
740	Model Predictive Control for DFIG to Improve the LVRT Capability Under Severe Asymmetric Grid Faults **Jiateng Gu, Zhenbin Zhang, Zhen Li, Jose Rodriguez**
725	Virtual Synchronous Generator Parameter Adaptive Adjustment Model Predictive Control **Nan Jin, Kaiyang Jia, Leilei Guo, Zhenjun Wu**
572	Improved Multistep Model Predictive Control for Six-Step Operation of Traction PMSM Drives **Zhenyao Sun, Shuai Xu, Guangtong Ma, Juri Jatskevich**
574 (Online)	A Wavelet Characters Based Adaptive Prediction Horizon for Multi-Step Predictive Torque Control on PMSM Drives **Yao Wei, Yanjun Wei, Shuaicheng Men, Zeyu Yang, Hanhong Qi**
589	Leakage Current Suppression Method Based on Optimal Switching Sequence Model Predictive Control for Flying Capacitor Three-level Inverter **Hao Ding, Mingming Li, Wei Wang**
681	Multi-Stage Model Predictive Control Algorithm with Eddy Current Compensation for FTPMF **Zhenglei Wang, Shaozhe Zhang, Chunhui Yang, Houxiu Xiao, Tonghai Ding, Xiaotao Han**
724 (Online)	A Control Strategy without Position Sensor in PMSM Electric Vehicle Drive **Zeyang Long, Zixin Li, Shuanghong Wang**

◆ Poster Session 3

Time: June 19th 10:15-11:15
Place: Public Area (公共区域)
Session Chairs: Bo Wang, Yahong Chen

Paper ID	Paper Title & Authors
732	Speed Model Predictive Control for SPMSM Based on EKF Observer **Guangyu Liao, Wei Xu, Siwei Cheng, Yirong Tang**
606	Alternating Sequential Model Predictive Control of Matrix Converter **Jianwei Zhang, Marco Rivera, Patrick Wheeler**
1	Model Predictive Control of PMSM Drives with Reduced DC-Link Capacitance **Jian Song, Wenxiang Song**
3 (Online)	A Hybrid Selective Harmonic Elimination Model Predictive Control Strategy for Four-Level Hybrid-Clamped Converters **Wei Chen, Nianzhou Liu, Wenfeng Long, Changqing Qiu, Xiaohui Xu, Kui Wang**
575	Virtual Vectors Based Model Predictive Control for Single-Phase Cascaded H-Bridge Converters **Tingting He, Mingli Wu, Jianguo Zhu**
611	Collaborative Model Predictive Control for High-Frequency Hybrid Power Amplifiers with High Efficiency and Low THD **Cheng Tang, Peng Guo, Qianming Xu, Yuze Li, Yingzhe Jia, Lixin Zhang, Zhou Zou, An Luo**
653	Active Zero-Sequence Current Suppression-Based Model Predictive Current Control for Series-End Winding PMSM Drives **Zhiping Dong, Rundong Huang, Zhengge Chen, Chunhua Liu**
692	Multi-Disturbances Suppression for Permanent Magnet Synchronous Motor based on Active Disturbance Rejection Model Predictive Control **Lingfeng Qiu, Kai Yang, Yixiao Luo, Wei Li**
694 (Online)	Long-Horizon Direct Model Predictive Control with Reduced Computational Complexity **Mattia Rossi, Petros Karamanakos, Arto Sankala**
630	Fast Three-Vector Model Predictive Current Control for PMSM Based on Current Deadbeat **Peiran Heng, Jianhu Yan, Chenggang Wang, Binru Su**

Paper ID	Paper Title & Authors
713	Full Predictive Control of Permanent Magnet Synchronous Machine Based on Differential-Free Disturbance Position-Torque Observer and Online Parameter Identification **Ping Jin, Weiyuan Wang, Yujing Guo, Gang Lei, Jianguo Zhu**
586	Predictive Torque Control of Induction Motor Based on Circular Boundary Restriction Strategy for Low Switching Frequency Application **Xin Qi, Chenyu Wang, Chao Che, Yi Deng, Mario Pacas**
594 (Online)	Dead-Time Compensation for Model-free Predictive Control in Multilevel Inverters **Yue Pan, Zhituo Ni, Mehdi Narimani, Margarita Norambuena, Jose Rodriguez**
642 (Online)	Parallel Model Predictive Control of Switched Reluctance Machine without Weighting Factors **Shoujun Song, Chenyi Yang, Minghui Wang, Lefei Ge, Zhaoyang Fu, Weiguo Liu**
597 (Online)	Fault Diagnosis of Cascaded H-Bridge Inverter Using Model Predictive Control **Yue Pan, Zhituo Ni, Ahmed Abuelnaga, Mehdi Narimani, Jose Rodriguez**
578	Study on Sensorless Predictive Control of Six Phase Fault-Tolerant Permanent Magnet Rim Driven Motor with Back-EMF Voltage and NPLL **Yonghan Liu, Jingwei Zhu, Tianrui zhao, Xiang Li, Wenzhi Cao**
743 (Online)	Reduction of Calculations Virtual Voltage Vectors-Based Predictive Control for 3-Level NPC Inverters with Constant Common-Mode Voltage **Majid Akbari, S.Alireza Davari, Reza Ghandehari, Freddy Flores-Bahamonde, Jose Rodriguez**
644 (Online)	Global Efficiency Optimal Control Strategy for Parallel Phase Shift Full-bridge Converter **Jizhou Liu, Chunyin Gong, Yiyun Zhang**

◆ Poster Session 4

Time: June 19th 10:15-11:15
Place: Public Area (公共区域)
Session Chairs: Yi Liu, Jian Ge

Paper ID	Paper Title & Authors
579	An Improved Model Predictive Control Strategy for Virtual Synchronous Generator with Adaptive Parameters **Nan Jin, Rui Wang, Xiaoliang Yang, Jiajun Bai, Yuyue Cui, Yihao Li**

Paper ID	Paper Title & Authors
626	Sensorless Model Predictive Current Control for SynRM Based on Alternate High-Frequency Square-wave Voltage Injection **Yuhao Huang, Kai Yang, Cheng Luo, Ruhan Li, Yixiao Luo**
710	Improved Resonant Frequency Tracking Strategy Based on Load Parameter Prediction for Linear Oscillatory Machine **Yifan Gong, Yang Cheng, Wei Xu, Kaiju Liao, Jian Ge**
726	Model Predictive Control for Salient Pole Offset Surface Inset Permanent Magnet Synchronous Motor **Ningning An, Ning Wang, Wenliang Zhao, Gaoyang Xu, Gefei Zhu**
668 (Online)	Analysis of Discharge Impulsive Torque Control of Pulsed Alternator Based on Genetic Algorithms **Shaopeng Wu, Chujie Dou, Bochao Du, Jiaqiang Yu**
696	Model Predictive Control of an Electromagnetic Levitation System of a Maglev Train Considering State Constraints **Zhenyu He, Yougang Sun, Fengxing Li, Dandan Zhang, Guobin Lin**
738 (Online)	Distribution Network Closed-Loop Control Method Using Controllable Distributed Generation Regulation Capability **Jinian Pang, Zhenghe Yang, Shaohua Han, Xiuru Wang, Aixiang Shi, Dong Qiu, Xuan Ge, Sha Chen**
636 (Online)	Model Predictive Control Strategy for Magnetic Gear Wave Energy Conversion System Considering Field Weakening Effect **Kainan Wei, Anni Jiang, Chuan Qin, Siyuan Wu, Yimeng Sun**
676	A Model Predictive Control for Maximizing Energy Absorption in Direct-Drive Wave Energy Converters **Jianlong Yang, Lei Huang, Lai Wei, Haitao Liu, Peiwen Tan, Minshuo Chen**
600	A Model Predictive Control Guided Partial Neural Network Compensation Method for Permanent Magnet Synchronous Motor Control **Siyu Tong, Yijie Liang, YuanHao Mo, Xiaoyun Zang, Yu Chen, Yong Kang**
623	Short-Term Load Forecasting Based on Echo State Network and LightGBM **Yuwang Miao, Jizhong Zhu, Hanjiang Dong, Ziyu Chen, Shenglin Li, Xiyu Wen**
567	None-Motor-Parameter Model Predictive Current Control for PMSM Drives **Xiaoguang Zhang, Ziwei Wang, José Rodríguez**
646	Robust Model Predictive Control with Continuous Control Set for PMSM **Teng Li, Xiaodong Sun**

Paper ID	Paper Title & Authors
568	Nonparametric Model Prediction Current Control for PMSM Drives **Xiaoguang Zhang, Zheng Liu, José Rodríguez**
599 (Online)	An Identification Method of Equivalent Mechanical Parameters of Ironless Permanent Magnet Synchronous Linear Motor Based on Stribeck Model **Yiwei Zhang, Xuzhen Huang, Jian Xu**
620	Stator Inductance Tuning in MRAS Position Observer for the Model Predictive Control of Variable Speed Pumped Storage Unit **Zhixin Mao, Yahong Chen, Wei Xu, Jose Rodriguez, Mohamed G Hussien, Essam M Rashad**
651	An Improved Power Compensation Based-on Model-Free Predictive Power Control of Vienna Rectifiers Under Distorted Power Grid **Qiyan Qu, Yongchang Zhang, Yuntao Shi**
712 (Online)	Extended Kalman Filter as the Prediction Model in Sensorless Predictive Control of Induction Motor **S. Alireza Davari, Shirin Azadi, Luca Tarisciotti, Zhenbin Zhang, Fengxinag Wang, Jose Rodriguez**
587	Two-Vector-Based Model Predictive Current Control for Synchronous Relunctance Machine Considering Saturation Effect **Sizhe Ren, Huan Wang, Yuanzhe Zhao, Linjie Ren, Guobin Lin**
612 (Online)	Reduced Flux Ripples for Linear Induction Machines Based-Two Voltage Vectors Finite State Model Predictive Control with MTPA **Mahmoud F. Elmorshedy, Wei Xu, Dhafer Almakhles, Kotb M. Kotb**

❖ Appendices

◆ Requirements for Oral and Poster Presentation

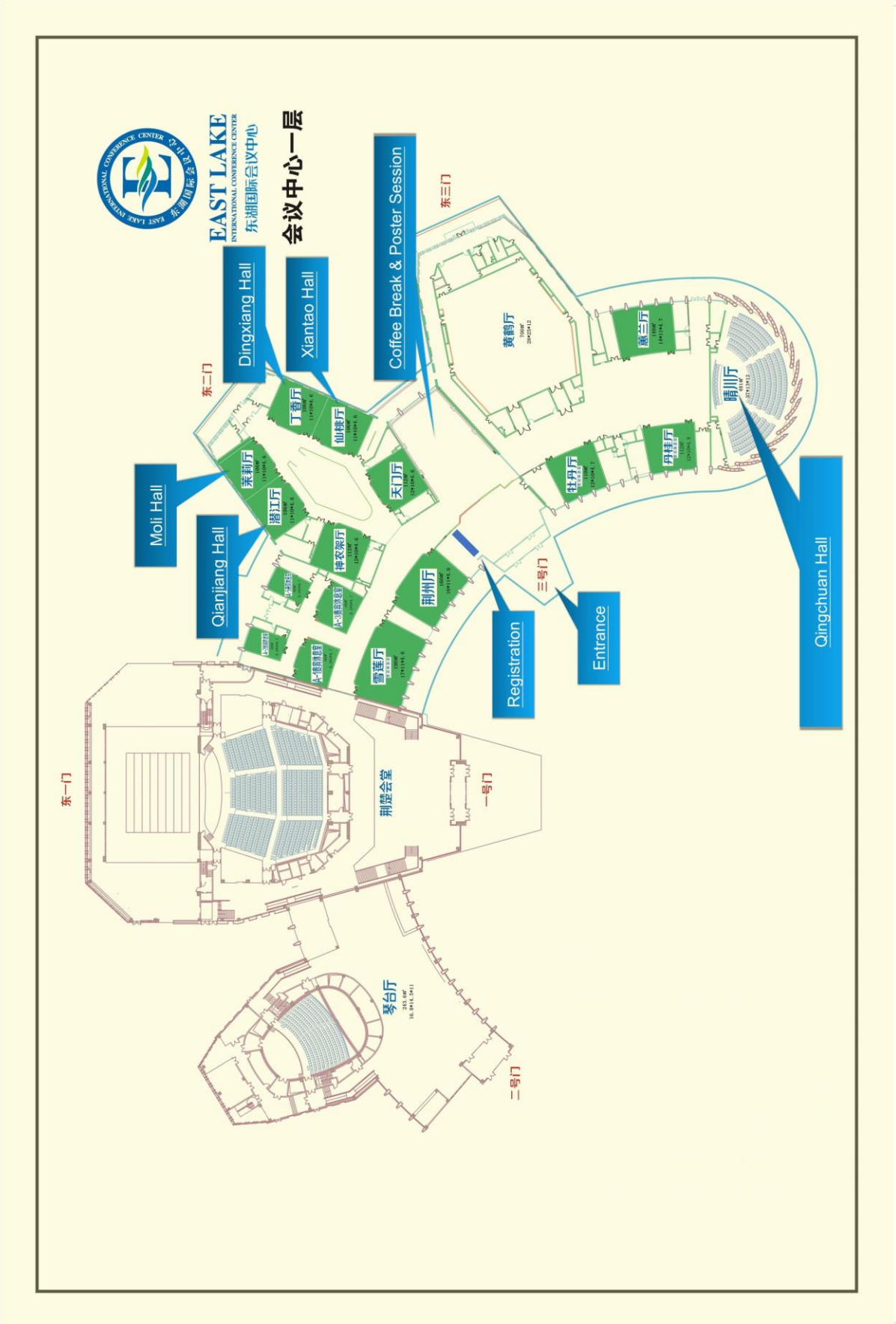
Oral Presentation

Please prepare your own presentation material in advance.
Presentation material should be prepared in MS-PowerPoint or pdf format in English.
The page ratio is 4:3.
Ensure the text, figures and tables are clear enough to be read.
The template can be made reasonable modification if needed.
Please arrive at the assigned room (whether in-person conference or virtual conference) at least 10 minutes early and make preparations.
Each presentation should last no more than 15 minutes. Questions and exchanges will last about 5 minutes.

Poster Presentation

To all presenters:
Please prepare your own poster materials in advance.
To presenters in In-person Conference:
Your poster should be placed on the assigned board for your assigned session.
Please stand at your poster during your assigned presentation time.
To presenters in Virtual Conference:
Your poster should be shown in the assigned online room for your assigned session.
Please stay online during your assigned presentation time.
Specifications:
· The poster surface area is 1.2-meter-high by 0.9-meter-wide.
· All text should be printed in a font large enough to be read comfortably from a distance of 1 meter.
· Ensure the figures and tables are clear enough to be read.
· Extensive text in posters is not encouraged.
· The layout of the poster should be clear and beautiful.
· The template can be made reasonable modification if needed.

◆ Conference Site Distribution

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蔡家嘴
弘毅大酒店
N
East-Lake Hotel sketch map
东湖宾馆平面示意图

◆ Conference Guide

Check-in

Convention Center Gate No.3

Time Arrangements

June 16th 09:00-21:00 Registration & Check in
June 16th 14:00-17:00 Tutorial
June 17th 09:00-17:00 Opening Ceremony & Invited Talk
June 18th 08:30-17:40 Oral Session
June 19th 09:00-11:15 Poster Session
June 19th 11:15-11:45 Award Ceremony & Closing
June 19th 14:00-17:30 Technical Tour

Dining Arrangements

Date	Lunch		Dinner	
	Time	Dining Hall	Time	Dining Hall
June 16th	--	--	17:00-19:00	Huangli Hall
June 17th	12:00-14:00	Huangli Hall	18:00-20:00	Huangli Hall
June 18th	12:00-14:00	Huangli Hall	18:00-20:00	Changjiang Hall
June 19th	12:00-14:00	Huangli Hall	--	--

Weather

Date	Weather
June 16th	Cloudy, 25~29℃
June 17th	Rainy, 23~29℃
June 18th	Rainy, 23~26℃
June 19th	Cloudy to rainy, 24~28℃

Contact Us

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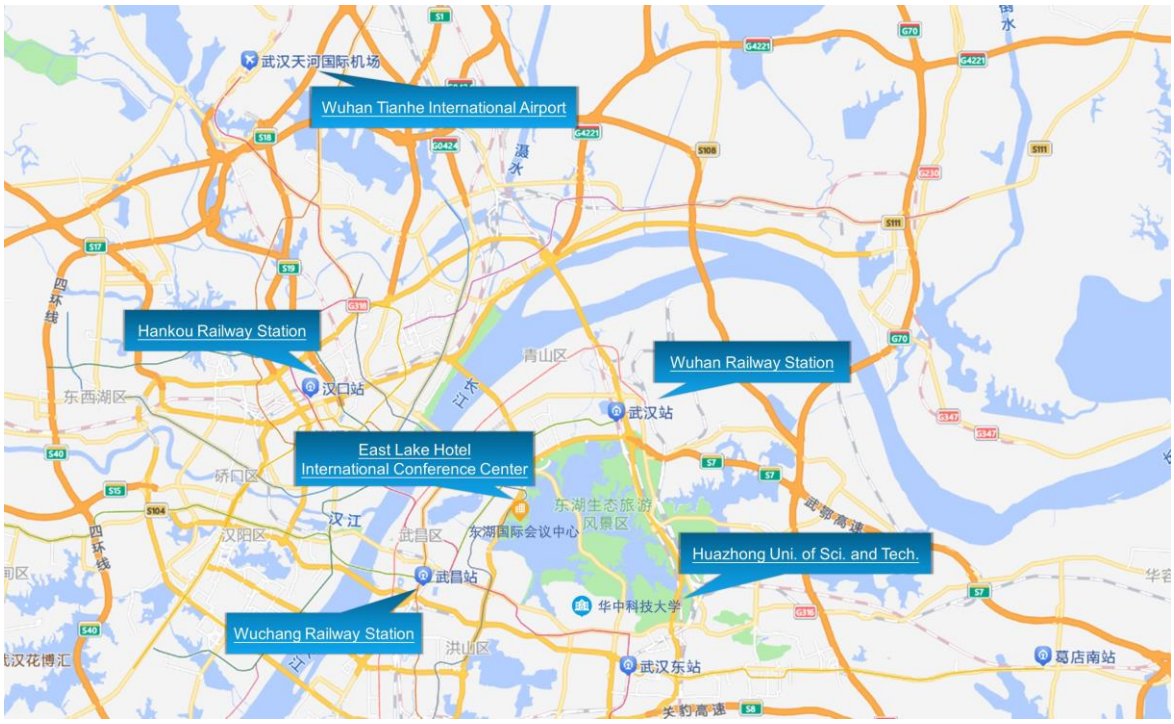
Transportation

Transportation Line to East Lake Hotel--International Conference Center



- From Tianhe Airport Subway Line 8 via Line 2 at "Hongtu Avenue" (1h 13min);
- From Wuhan Railway Station Subway Line 8 via Line 4 at "Yuejiazui" (43min);
- From Wuchang Railway Station Subway Line 8 via Line 4 at "Yuejiazui"(42min);
- From Hankou Railway Station Bus no. 411 (1h 45min); Subway Line 8 via Line 2 at "Jiedaokou" (1h 6min);
- From HUST Bus no. 709/810 (1h 20min); Subway Line 8 via Line 2 at “Jiedaokou” (50min).

Public transport: Bus 411/709/810, stop at "Donghu Road Provincial Museum (front station)"; Subway Line 8, stop at "Hubei Museum".

You can also take **taxi** from those airport/railway stations to East Lake Hotel, which takes about 94 (from Tianhe Airport), 26 (from Wuhan Railway Station), 20 (from Wuchang Railway Station), 54 (from Hankou Railway Station), 28 (from HUST) RMB Yuan

❖ Introduction to HUST SEEE

Huazhong University of Science and Technology (HUST) is a national key university and directly belongs to the Ministry of Education. It is one of the first universities included in the national "Project 211" key construction and national "Project 985" construction. It is among the first batch of national "Double First-Class" universities in 2017. The school covers more than 7,000 acres and is located on the bank of East Lake in the core area of China's Optics Valley. With beautiful campus environment and large amount of green trees, the university has a greening rate of 72% and is known as a "forest-style university". The adjacent 'East Lake Green Road' has created a world-class leisure and fitness 'backyard garden' for teachers and students.

The School of Electrical and Electronic Engineering (SEEE) of HUST was founded in 1952. In all previous first-level discipline evaluation by the Ministry of Education, the rank of electrical engineering discipline of this school is always among the top three in China. In 2017, it was selected as one of the first batch of "double first-class" construction disciplines by the country.

The school has strong faculty and has formed a high-level academic team with clear research directions and balanced research forces in all research areas. There are 78 professors and 71 associate professors, including 1 academician of the Chinese Academy of Sciences, 2 academicians of the Chinese Academy of Engineering, 2 national-level teaching teams, 2 innovation teams of the Ministry of Education, and 1 innovation team in the key areas of the Ministry of Science and Technology.

The school has established Department of Electrical and Control Engineering, Department of Electrical Power Engineering, Department of High Voltage Engineering, Department of Applied Electronic Engineering, Department of Electrician Theory and Advanced Electromagnetic Technology, Institute of Fusion and Plasma, Institute of Applied Electromagnetic Engineering, National Electrical and Electronic Experimental Teaching Demonstration Center (Electrical), and National Electrical Electronic Engineering Basic Course Teaching Base (Electrical).

The main research directions of the school cover the entire process of production, transmission, application, transformation, detection, control, dispatching and management of electric energy. Moreover, it has also developed numbers of new frontier disciplines, such as electrical energy storage, pulse power, pulsed magnetic fields, magnetic confinement fusion, plasma medicine, accelerators and their applications, advanced electrical materials and devices, which have formed the widest range of electrical engineering disciplines in domestic research.

The college has the most complete scientific research and innovation platform in the domestic electrical disciplines. It has a national major science and technology infrastructure, a national key laboratory, a joint laboratory for international cooperation. Among them, the Pulsed High Magnetic Field Facility (PHMFF) is the only national major science and technology infrastructure in China's electrical engineering disciplines, and it has become one of the best pulsed magnetic field facilities in the world; the Joint Laboratory for International Cooperation in Fusion and Electromagnetic Technology owns the

only large and medium-sized Tokamak J-TEXT among domestic universities, which is a training and basic research base for magnetic confinement fusion talents recognized by the Ministry of Education; it has the only national new-type motor national specialized laboratory; and it also has several provincial and ministerial key laboratories and engineering research centers with research areas of electric power safety, new-type motors, pulse power, and ship power, etc.

The school put the quality of talent training first. The school is one of the first batch authorized units of master's programs, doctoral programs, post-doctoral mobile stations, and first-level discipline doctoral programs in China. There are more than 1,700 undergraduate students and more than 1,000 graduate students. The quality of talent training has been highly recognized by the society. Every year, there are over one million social scholarships set up by companies, and hundreds of special job fair for graduates.

The school has undertaken a number of important national research tasks with more than 300 million RMB research funding each year in recent five years, it has been authorized more than 350 national invention patents, 6 European and US patents, published more than 1300 SCI papers, and 36 ESI hot papers. It has also obtained 2 first prizes and 6 second prizes of the National Science and Technology Progress Award.

The academic exchanges of school are active. Multi teachers serve in significant science and technology consulting qualification committee such as the National Major Science and Technology Infrastructure Planning Committee, the National Major Special Expert Committee, and the International Strong Magnetic Field Association. The school has established long-term and deep cooperative relations with more than 20 scientific research institutions including Princeton University, National High Magnetic Field Laboratory (USA), the Max Planck institute for plasma physics (Germany), the controlled fusion institute of French Atomic Energy Commission, and was invited to participate in the ITPA international joint experiment. The school has jointly undertaken seven Sino-U.S. fusion cooperation projects jointly organized by the Chinese Ministry of Science and Technology and the U.S. Department of Energy.

All teachers and students of the school aim to build a world-class electrical engineering discipline. With the development of high-tech electrical engineering and electric power technology as the leading factor, they condense the directions of the discipline, gather research teams, build academic bases, alcoholize the academic atmosphere, unite and be pragmatic, seek truth and innovation to create a better future for electrical engineering disciplines.

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Prof. Shihua Li	IEEE Fellow	Southeast University
Prof. Fengxiang Wang	IET Fellow	Chinese Academy of Sciences
Prof. Zhenbin Zhang	IET Fellow	Shandong University

We are glad to welcome you to Nanjing in 2025!

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公司简介

云牧科技以自主研发助力国家实现“碳达峰、碳中和”为目标，深入贯彻“绿色发展”理念，坚持“创新驱动发展”战略。以节能和能耗监管为切入点，致力于在新型能源、综合能源、节约能源等领域采用轻量化的模式，对能源利用和消耗进行实时监测、数据分析、智慧管理、降本增效提供整体解决方案。所完成的项目，接受了国家领导人的视察指导，专访登上《新闻联播》和《焦点访谈》的报道。

公司为全国《公共机构高效制冷解决方案》参与编制单位；国家发改委、科技部、工信部、自然资源部《绿色技术推广目录（2020）》中“建筑能源监管与空调节能控制技术”建议单位。产品成功入选国管局《全国公共机构节能节水技术集》，获得中国质量认证中心颁发的空调物联网节能技术量化认定证书，拥有多项自主知识产权，并通过 CCC 认证，成功入选国家机关事务管理局公共机构的第一批节能产品网上展厅（全国仅13家）。公司获得中国饭店协会颁发的最高奖《金鼎奖》，并与国家电网、中国人民解放军军事科学院、中国移动、中国电信、中国联通、中国铁塔、多所高校、多地政府机关、全国 2000 多家酒店等合作。

公司已合作项目有中国人民解放军军事科学院风机节能项目、中国教育部中教研究院空调物联网节能项目、雄安新区分体空调物联虚拟电厂项目、河北碳排放用电监测平台项目、马鞍山钢铁集团的分体空调智慧节能项目、康师傅工厂能耗监测平台项目、广西柳州螺蛳粉产业园工业物联网综合管理平台项目等。

智慧管控解决方案

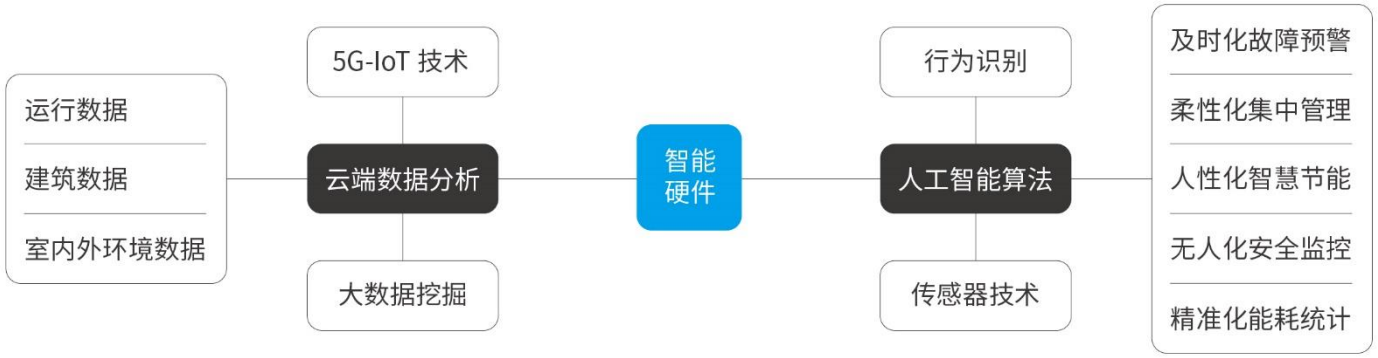

综合能源管理


广告灯箱管控


政企空调管理


酒店节能管理


场景需求定制




空调管家


智能插座


中央空调智控器


分体空调智控器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智能管理平台

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■ 湖南中车尚驱电气有限公司 HUNAN CRRC SHANGQU ELECTRIC CO., LTD.

湖南中车尚驱电气有限公司是中车株洲电机有限公司的核心控股子公司，国企改革双百行动首批试点企业，前身是中车株洲电机有限公司工业驱动事业部、高速永磁电机项目部。

公司响应国家倡议，切实推动“碳达峰、碳中和”战略实施，依托完整的技术创新平台和试验验证体系，聚焦高端装备电机技术研发，推出了极具市场竞争力的智能化高效节能电机产品，主营业务为高速永磁电驱、中低速永磁电驱、煤矿驱动系统、工业电驱系统、油田驱动系统等产业板块，致力于成为全球一流的永磁驱动技术引领者及成套方案解决商。

Hunan CRRC Shangqu Electric Co., Ltd is a core holding subsidiary of CRRC Zhuzhou Electric Co, Ltd. It is one of the first batch of pilot enterprises of state-owned enterprise reform, and its predecessor is the industrial drive business department and high-speed permanent magnet motor business department of CRRC Zhuzhou Electric Co. Ltd.

In response to the national initiative, Hunan CRRC Shangqu Electric Co., Ltd has effectively promoted the implementation of the strategy of “carbon peak, carbon neutralization”. Relying on the complete technology innovation platform and test verification system, focusing on the research and development of high-end equipment motor technology, Hunan CRRC Shangqu Electric Co., Ltd has launched highly competitive intelligent, high-efficiency and energy-saving motor products.

Its main business includes high - speed permanent magnet electric drive, medium and low - speed permanent magnet electric drive, coal mine drive system, industrial electric drive system, oil-field drive system and other industrial sectors. It is committed to becoming a world-class leader in permanent magnet drive technology and a complete solution provider.

■油田装备事业部 OILFIELD EQUIPMENT BUSINESS UNIT

公司响应国家新形势下保障基础能源安全战略以及高端装备制造业“十四五”发展规划，依托集团公司轨道交通及风力发电产品在复杂应用环境适应性、运行可靠性上的技术积累以及公司专家团队研发力量，致力于为石油及化工行业提供智能化、能源驱动产品和服务，助力油田企业绿色、低碳、数字化、高质量发展战略。

公司油田装备产业目前已涵盖油井钻机、石油开采、燃气发电等领域。

Oilfield equipment business division is the platform of the oilfield equipment industry of Hunan CRRC Shangqu Electric Co, Ltd.

In response to the national strategy of ensuring basic energy security under the new situation and the 14th Five-Year development plan of high-end equipment manufacturing industry, the company is committed to providing intelligent energy driven products and services for the petroleum and chemical industries, and helping the green, low-carbon, digital and high-quality development strategy of oilfield enterprises by relying on the technical accumulation of adaptive operation reliability of the CRRC Group's rail transit and wind power generation products in complex application environment and the research and development strength of the company's expert team Energy-driven products and services help oilfield enterprises develop green, low-carbon, digital and high-quality development strategies.

At present, the oilfield equipment industry of our company has covered oil well drilling rig, oil exploitation, gas power generation and other fields.

“零代码”开发平台引领者

ZERO CODE DEVELOPMENT PLATFORM LEADER

南京瑞途优特信息科技有限公司（RTUNIT®）成立于2016年，是一家专注于图形化可编程控制器及电机驱动控制、电力电子、工业自动化等相关技术领域的国家高新技术企业。

瑞途优特于2018年推出了国内第一款自主研发的实时数字控制器RTU-BOX，支持SIMULINK模型和C语言两种开发模式。其丰富的硬件资源、迭代改进的系统性能、符合国人使用习惯的软件以及完善的本土化服务得到了越来越多用户的肯定与支持。公司还拥有RTM系列积木式电力电子功率模块，RTI系列集成式驱动器、RTP系列高功率密度电源等多个产品系列，并可提供基于这些产品的一整套解决方案和相关配套服务。

瑞途优特是一个技术专业、拥有梦想、充满活力、团结奋进的团队，始终坚持自主研发、持续创新、严控质量、用心服务的理念，不断追求“让控制简单高效！”。

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RTU-BOX206

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400V-25A / H桥

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800V-20A / 半桥

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实时数字控制器

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功率5KW~144KW

三相驱动器
RTI-INV6010IR
IGBT / 三相全桥

并网滤波器
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电机对拖平台

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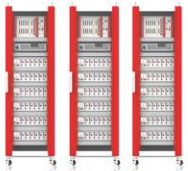
模块化多电平变流器



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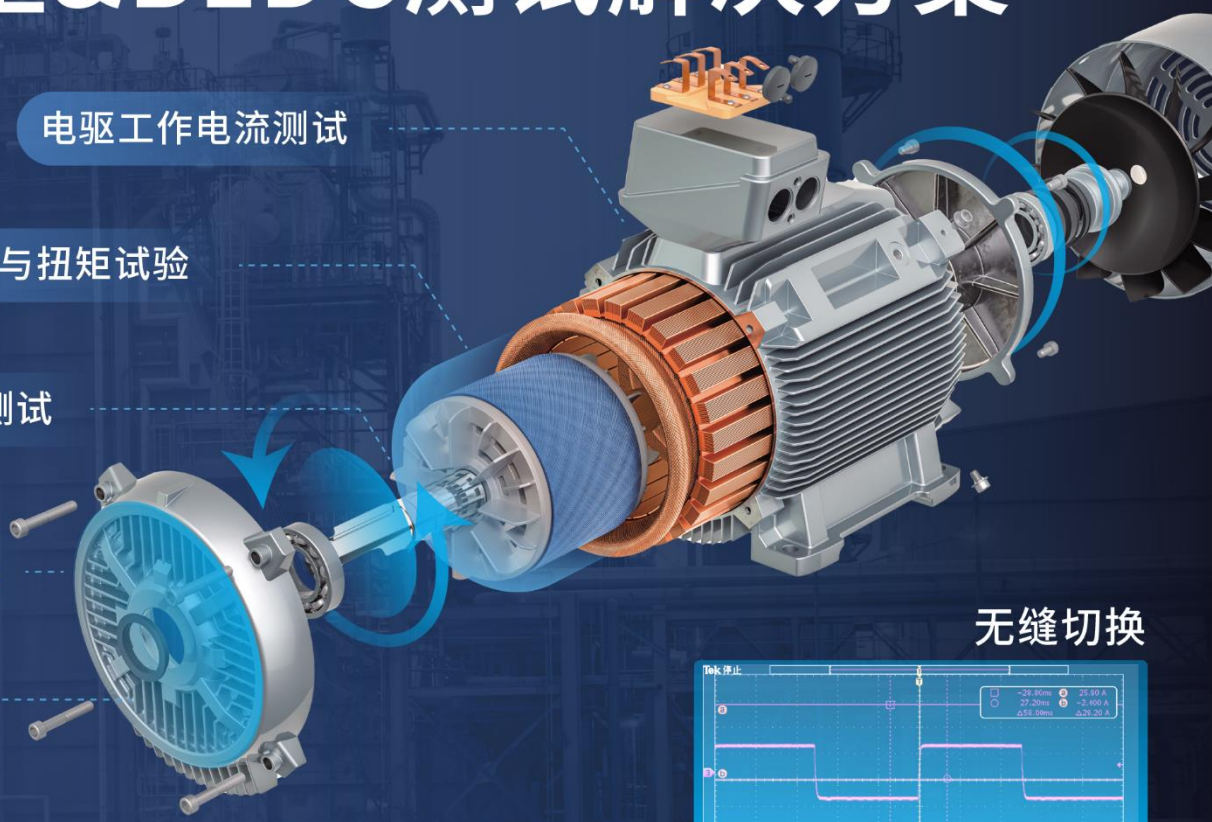

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