

## Training and internship

### List (Cert. of Competence):

[1] China Energy Engineering Group Hunan Electric Power Design Institute Co., Ltd.

Aug 2022 - Sep 2023

[2] Institute of Plasma Physics, Chinese Academy of Sciences, Hefei, China

Aug 2021 - Sep 2022

[3] Institute of Plasma Physics, Chinese Academy of Sciences, Hefei, China

Sep 2021 - Sep 2023

[4] Hunan Provincial Degree Committee of the People's Government Summer school classes

Aug 2022 - Sep 2022

[5] 2023 Tsinghua-IET Electrical Engineering Academic Forum

May 27, 2022 – May 31, 2022

## “储能电池+超级电容复合储能系统在多场景应用条件下的关键技术研究”项目应用证明

兹证明，中南大学自动化学院宋冬然老师受我院委托，于“储能电池+超级电容复合储能系统在多场景应用条件下的关键技术研究”专项技术服务项目(合同编号: HFW202300091)中，为我院开发复合储能系统仿真平台 1 套，并于 2023 年 8 月 31 日通过验收。

开发人员名单如下：晏嘉琪、孟维琦。

特此证明。

中国能源建设集团湖南省电力设计院有限公司

2023 年 9 月 20 日



**Application Proof for the Project 'Key Technologies Research of Energy Storage Battery + Supercapacitor Composite Energy Storage System under Multi-scenario Application Conditions**

This is to certify that Prof. Song Dongran from the School of Automation, Central South University, commissioned by our institution, has developed one set of composite energy storage system simulation platform for our institution within the specialized technical service project titled 'Key Technologies Research of Energy Storage Battery + Supercapacitor Composite Energy Storage System under Multi-scenario Application Conditions' (Contract Number: HFW202300091). This development was successfully accepted on August 31, 2023.

The list of developers is as follows: Yan Jiaqi, **Meng Weiqi**.

This serves as confirmation.

China Energy Construction Group Hunan Electric Power Design Institute  
Co., Ltd.

September 20, 2023

## “储能电池+超级电容复合储能系统在多场景应用条件下的关键技术研究”项目结题证明

兹证明，中南大学自动化学院宋冬然老师受我院委托，完成“储能电池+超级电容复合储能系统在多场景应用条件下的关键技术研究”专项技术服务项目(合同编号: HFW202300091)。为我院开发复合储能系统仿真平台 1 套，达到合同要求，于 2023 年 8 月 31 日通过验收。

特此证明。

中国能源建设集团湖南省电力设计院有限公司

2023 年 9 月 20 日



# 中国科学院合肥物质科学研究院

---

## “电力电子化能源设备数学建模研究”项目应用证明


兹证明，中南大学自动化学院宋冬然老师受我院委托，于“电力电子化能源设备数学建模研究”专项技术服务项目(合同编号: IPP-DL-21071605)中，为我院开发电力电子化能源设备仿真模型，并于 2022 年 8 月 18 日通过验收。

开发人员名单如下：孟维琦

特此证明。

中国科学院合肥物质科学研究院

2022 年 9 月 7 日



---

**Application Proof for the Project 'Mathematical Modeling  
Research of Power Electronic Energy Equipment'**

This serves as certification that Prof. Song Dongran from the School of Automation, Central South University, commissioned by our institution, has developed power electronic energy equipment simulation models for our institution within the specialized technical service project titled 'Mathematical Modeling Research of Power Electronic Energy Equipment' (Contract Number: IPP-DL-21071605). This development was successfully accepted on August 18, 2022.

The list of developers is as follows: **Meng Weiqi.**

This serves as confirmation.

Hefei Institutes of Physical Science, Chinese Academy of Sciences  
September 7, 2022

# 中国科学院合肥物质科学研究院

---

## “电力电子化能源设备数学建模研究”项目结题证明

兹证明，中南大学自动化学院宋冬然老师受我院委托，完成“电力电子化能源设备数学建模研究”专项技术服务项目(合同编号: IPP-DL-21071605)。为我院开发电力电子化能源设备仿真模型，达到合同要求，于 2022 年 8 月 18 日通过验收。

特此证明。


中国科学院合肥物质科学研究院

2022 年 9 月 7 日





参研项目证明

项目名称	面向工业园区分布式能源系统集约化管理的关键技术及设备研发		
项目来源	<div>项目编号：202003a05020019</div> <div><div><input type="checkbox"/> 国家科技重大专项</div><div><input type="checkbox"/> 973 计划</div><div><input type="checkbox"/> 863 计划</div><div><input type="checkbox"/> 国家科技支撑计划</div><div><input type="checkbox"/> 科技部其他计划</div><div><input type="checkbox"/> 国家自然科学基金</div><div><input type="checkbox"/> 教育部项目</div><div><input checked="" type="checkbox"/> 省市项目</div><div><input type="checkbox"/> 其他部委项目</div><div><input type="checkbox"/> 其他：</div></div>		
项目承担单位	中国科学院合肥物质科学研究院		
项目经费	100 万元	项目起止时间	2020 年 10 月- 2023 年 9 月
本人在项目中的具体工作（主要参与人）			
<div>参与项目中关于“源-网-荷-储”实时调度策略的研究：</div> <div>(1) 分布式能源系统的功率和负荷预测</div> <div>根据分布式能源特点及负荷的时间特征进行经验模态分解，得到表征信号振荡特性的本征模态函数和残差，采用小波变换实现表征信号的深度分解；利用卷积神经网络提取信号的关联依赖特征并送入全连接网络，实现高精度的功率及负荷预测。</div> <div>(2) 源-网-荷-储实时调度策略研究</div> <div>基于预测数据，以日综合费用最低为目标函数，建立源-网-荷-储经济优化调度模型，基于 Hessian 矩阵迭代的内点法进行求解，充分利用修正矩阵的稀疏性，实现了分布式能源系统的实时调度。</div>			
项目负责人评价			
<div>中南大学自动化学院孟维琦同学，在安徽省科技重大专项项目“面向工业园区分布式能源系统集约化管理的关键技术及设备研发”中，参与了项目中关于“源-网-荷-储”的实时调度策略研究，对分布式能源系统的功率和负荷预测和“源-网-荷-储”实时调度策略进行了方案设计，实现了分布式能源系统经济最优调度。依托项目经费，完成 SCI 论文 3 篇，其中 2 篇已返修提交。</div> <div>负责人签名：黄连生</div> <div>项目承担单位盖章</div> <div></div>			



# Proof of participation in research projects

Project	Key Technology and Equipment Development for Intensive Management of Distributed Energy Systems in Industrial Scenarios		
Type of Project	Project number: <u>202003a05020019</u> <input checked="" type="checkbox"/> Provincial key scientific research projects		
Name of Organization	Institute of Plasma Physics, Chinese Academy of Sciences		
Funds	1, 000, 000. 00 RMB	Participation Period:	October 2020 – September 2023
Specific work in the project (Key member)			
<p>Research on the real-time scheduling strategy of "source-grid-load-storage" in the project:</p> <p>(1) Power and load forecasting in distributed energy systems:          Employing empirical mode decomposition to capture the temporal characteristics of distributed energy and load, deriving intrinsic mode functions and residuals representing signal oscillations. Utilizing wavelet transform for in-depth signal decomposition, employing convolutional neural networks to extract correlated features and feeding them into a fully connected network for highly accurate power and load forecasting.</p> <p>(2) Research on real-time scheduling strategy for "Generation-Grid-Load-Storage":          With economic efficiency as the objective, and power balance, equipment capacity, and operational costs as constraints, construct an economic optimization scheduling model for source-grid-load-storage. The model is solved using the Hessian matrix iterative interior point method, enabling the achievement of the optimal economic dispatch for the distributed energy system.</p>			
Evaluation by the project leader			
<p>Mr. Meng Weiqi, a student from the School of Automation at Central South University, actively contributed to the Anhui Provincial Science and Technology Major Project, "Key Technology and Equipment Development for Intensive Management of Distributed Energy Systems in Industrial Scenarios". In particular, he was involved in the research on real-time scheduling strategies for the "Source-Grid-Load-Storage" framework within the project. Mr. Meng played a key role in designing solutions for power and load forecasting in distributed energy systems and real-time scheduling strategies for "Generation-Grid-Load-Storage," ultimately achieving economically optimal scheduling for distributed energy systems. Leveraging project funding, he successfully completed three SCI papers, with two of them already submitted after revisions.</p>			
<div style="text-align: right;">Supervisor's Signature: <i>Huang Liansheng</i></div>			

# 结业证书



孟维琦 同学:

于2022年8月25日至8月29日参加由湖南省教育厅举办，中南大学承办的2022年湖南省“制造过程智能化与双碳战略”国际研究生暑期学校，经考核合格，准予结业。

湖南省人民政府学位委员会办公室

2022年9月26日



## **Certificate of Completion**

**Central South University**

**Meng Weiqi**

Mr. Meng Weiqi:

Participated from August 25th to August 29th, 2022, in the 2022 Hunan Province International Graduate Summer School on 'Intelligent Manufacturing Processes and Dual Carbon Strategy,' organized by the Hunan Provincial Department of Education and hosted by Central South University. Having successfully passed the assessment, is hereby granted the certificate of completion.

This serves as confirmation.

Office of the Hunan Provincial Degree Committee of the People's Government

September 26, 2022





# Tsinghua-IET Electrical Engineering Academic Forum

This is to certify that

**Weiqi Meng**

participated in the

**2023 Tsinghua-IET Electrical Engineering  
Academic Forum**

On

**27-28 May, 2023**

On behalf of the Organisers

