



# 第四届国际水利与环境工程学会 水力机械及系统亚洲分会学术会议

The 4th IAHR Asian Working Group Symposium  
on Hydraulic Machinery and Systems

会议手册  
Conference Manual

中国·喀什  
Kashgar, China  
2023.8.12-8.16

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## **I. Instructions / 会议须知**

1. All the symposium attendees must abide by Chinese laws and regulations, participate in activities according to the meeting arrangements and related agendas.
2. Please do not walk around during the meetings. Please turn your mobile phone to silent or vibrate mode, and maintain good discipline in all meeting areas.
3. All the attendees should not go to other crowded places other than the meeting venues during the conference. Please pay attention to the safety of yourselves and your personal belongs.
4. Please pay attention to the safety of driving during the conference. When you travel between the meeting venues, please use the vehicles allocated to and from the venues according to the unified allocations of the organizing committee.
5. The weather in Xinjiang is dry, windy and sandy. It is recommended that you pay more attention to drink plenty of water and take a lip balm. We suggest that you take a coat, in case sudden climate changes.
6. If you and your companies encounter difficulties or emergencies during the conference, please contact the organizing committee immediately to get help.

1. 须遵守中国法律法规，按照会议安排及相关议程参加活动。
2. 大会期间请勿随意走动，将手机调整为静音或振动模式，保持会场纪律。
3. 会议期间请勿前往非会场内的人员密集场所，注意人身安全及财产安全。
4. 会议期间请注意乘车安全，请按照组委会统一分配乘用车辆往返会场。
5. 新疆地区气候干燥且风沙大，建议您多注意饮水、准备润唇膏，携带防寒外衣，以防天气突变。
6. 参会嘉宾及代表在会议期间如遇到困难或突发事件，请及时与组委会联系解决。

## II. Background / 会议背景

The international Association for Hydro-Environment Engineering and Research (IAHR), founded in 1935, one of the IAHR Committee is the Hydraulic Machinery and Systems, which deals with the advancement of technology associated with the understanding of steady and unsteady flow characteristics in hydraulic machinery and conduit systems connected to the machinery, and the main emphasis is to promote interaction between the machine designers, machine users, the academic communities, and the communities at large.

To meet its objectives, the Committee focuses on the best possible exchange of technical knowledge by arranging Committee Symposia every second year. The Symposia are designed to attract scientists and engineers from industries, universities, consultants and users of hydraulic machinery. In addition, the Committee established “Asian Working Group” specially to promote the exchange and cooperation of hydraulic machinery industry in Asian countries.

In recent years, water conservancy and hydropower in Asia have been developing dramatically. Hydraulic machinery like pump, pump turbines etc., are widely used in project construction. There are plentiful scientific and technical payoffs achieved within the related researches. "Asian Working Group" has held three symposiums on hydraulic machinery and systems, which are: IAHR 2017 Asia Beijing, IAHR 2019 Asia Busan, IAHR 2021 Asia Nepal. And all conference proceedings have been published in IOP.

国际水利与环境工程学会（IAHR）成立于 1935 年，其中的水力机械及系统委员会致力于推动水力机械及系统相关研究的理解与技术进步，促进水力机械勘测、设计、研究、制造、运行、咨询等社会各界间的联系与互动。委员会每两年安排一次学术研讨会，聚焦先进技术与知识的学术交流。委员会专门成立了“亚洲工作组”，以促进亚洲水力机械及系统的学术交流与合作。

近年来，亚洲水力机械及系统得到了长足发展。“亚洲工作组”已经成功举行了三次水力机械及系统学术研讨会，分别是：IAHR2017 北京、IAHR2019 釜山、IAHR 2021 尼泊尔。会议论文集均已在 IOP 发表。

欢迎各位参加第四届国际水利与环境工程学会水力机械及系统亚洲分会学术会议。

### **III. Scope / 议题范围**

The organizing committee encourages and welcomes the original research papers on the following topics: Intake system, Hydraulic turbines, Pump-turbines, Pumps, Storage pumps, Ocean energy, Small and micro hydropower, Sustainable hydropower, Energy storage and flexibility, Cavitation and multiphase flow, Multi-field coupling, Computational fluid dynamics and fluid-structure interaction, Sediment erosion, Vortex breakdown, Vibration and fatigue loading, Measurement techniques and signal processing, Model tests and laboratory tests, Smart grid and digital twin, Selected topics.

组委会鼓励并欢迎以下主题的原创研究论文：输水系统、水轮机、水泵水轮机、泵、蓄能泵、海洋能、小微水电、可持续水电、储能与灵活性、空化与多相流、多场耦合、计算流体力学与流固耦合、泥沙磨蚀、旋涡溃灭、振动与疲劳、测量技术与信号处理、模型试验与实验测量、智能电网与数字孪生，自选主题。

### **IV. Organization / 会议组织**

Organizers: Tsinghua University and China National Nuclear Corporation-Xinhua Hydropower Company Limited.

Co-organizers: Dongfang Electric Machinery Co., Ltd., Harbin Electric Machinery Co., Ltd., Jiangsu University, Xi'an University of Technology, Hohai University, Zhejiang University of Water Resources and Electric Power, Andritz (China) Co., Ltd., Xihua University and Northwest A&F University.

Supporting Organizations: China Electricity Council, Chinese Hydraulic Engineering Society and China Society for Hydropower Engineering.

主办单位：清华大学、中核集团新华水力发电有限公司

协办单位：东方电气集团东方电机有限公司、哈尔滨电机厂有限责任公司、江苏大学、西安理工大学、河海大学、浙江水利水电学院、安德里茨（中国）有限公司、西华大学、西北农林科技大学。

支持单位：中国电力企业联合会、中国水力发电工程学会、中国水利学会。

## V. Venue / 地点

Plenary venue: Nanjiang global port (harbor) international hotel, No.291 Western Regions Road (Xiyu Avenue), Kashgar (Kashi), Xinjiang Uygur Autonomous Region, China. Tel: 0998-2912111.

Parallel Venue: Kashgar Laining Hotel, No. 160, Jianshe Road, Kashgar (Kashi), Xinjiang Uygur Autonomous Region, China. Tel: 0998-2912111.

Accommodation:

Option 1: Nanjiang global port (harbor) international hotel (main venue)

Option 2: Qinibagh royal hotel, No.144 Seman Rd, Kashi Region, Xinjiang, China.  
Tel: 0998-5822222

主会场：南疆环球港酒店（喀什市西域大道 291 号），联系方式：0998-2318888。

分会场：喀什徕宁饭店（喀什市建设路 160 号），联系方式：0998-2912111。

住宿酒店：

选择 1：南疆环球港酒店（主会场）。

选择 2：其尼瓦克酒店（喀什市喀什色满路 144 号），联系方式：0998-5822222。

## VI. Overview programme / 日程概览

Time zone: Beijing Time (UTC+8 /GMT+8)

| Aug. 12 <sup>th</sup><br>Saturday                                   | Aug. 13 <sup>th</sup><br>Sunday   | Aug. 14 <sup>th</sup><br>Monday  | Aug. 15 <sup>th</sup><br>Tuesday  | Aug. 16 <sup>th</sup><br>Wednesday  |
|---|---|--|---|---|
|   | Participants who staying at Qinibagh royal hotel are requested to assemble in lobby at 8:50. The bus depart at 9:00 for Nanjiang hotel. | Participants are requested to assemble in lobby at 8:50. The bus depart at 9:00 for Laining hotel. | Participants who staying at Qinibagh royal hotel are requested to assemble in lobby at 8:50. The bus depart at 9:00 for Nanjiang hotel.   | Participants are requested to assemble in lobby at 7:20. The bus depart at 7:30 for Altash. |
|   | Opening ceremony (09:50-11:00)<br>Group photo (11:00-11:30)<br>Plenary (11:30-14:00)  | Parallel sessions (10:00-12:00)<br>Coffee break (12:00-12:15)<br>Parallel sessions (12:15-14:00)   | Plenary (10:00-11:40)<br>Coffee break (11:40-12:00)<br>Plenary (12:00-14:00)  | Bus ride (7:30-12:00)<br>Scientific tour - Altash Key Water Control Project (12:00-14:00)   |
|   | Lunch:<br>Nanjiang global harbor international hotel Buffet Western Restaurant in 1st and 2nd floors.<br>(14:00-16:00)                  | Lunch:<br>Laining hotel Buffet Western Restaurant in 1st floor.<br>(14:00-16:00)                   | Lunch:<br>Nanjiang global harbor international hotel Buffet Western Restaurant in 1st and 2nd floors.<br>(14:00-16:00)  | Lunch:<br>Canteen in Altash (14:00-15:30)   |
| Registration at lobby of Nanjiang and Qinibagh hotel. (14:00-21:00) | Plenary (16:00-17:40)<br>Coffee break (17:40-18:00)<br>Plenary (18:00-19:40)  | Parallel sessions (16:00-18:00)<br>Coffee break (18:00-18:15)<br>Parallel sessions (18:15-20:00)   | Plenary (16:00-18:00)<br>Coffee break (18:00-18:20)<br>Free discussion on technical exchange (18:20-19:00)<br>Executive Committee meeting (18:00-19:00)<br>Closing ceremony (19:00-20:00) | Bus ride (15:30-20:00)  |

|   |  |   |   |   |
|---|--|---|---|---|
| Dinner:<br>Nanjiang<br>global harbor<br>international<br>hotel Buffet<br>Western<br>Restaurant in<br>1st floor.<br>/<br>Qinibagh royal<br>hotel Western<br>Buffet<br>Restaurant in<br>1st floor.<br>(19:30-21:30) | Banquet:<br>Nanjiang global<br>harbor international<br>hotel<br>Lanxuan Chinese<br>Restaurant in 2nd<br>floor, Chongming<br>and Fengxian<br>Chinese Restaurant<br>in 3rd floor.<br>(20:00-21:50) | Dinner:<br>Laining hotel<br>Buffet Western<br>Restaurant in 1st<br>floor.<br>(20:00-21:30)  | Dinner:<br>Nanjiang global<br>harbor international<br>hotel Buffet Western<br>Restaurant in 1st and<br>2nd floors.<br>(20:00-21:30) | Dinner:<br>Nanjiang global<br>harbor<br>international hotel<br>Buffet Western<br>Restaurant in 1st<br>floor.<br>(20:00-21:30) |
| /   | Participants are<br>requested to<br>assemble in lobby at<br>21:50. The bus<br>depart at 22:00 for<br>Qinibagh hotel.   | Participants are<br>requested to<br>assemble in<br>lobby at 21:30.<br>The bus depart at<br>21:40 for<br>Nanjiang and<br>Qinibagh hotel. | Participants are<br>requested to<br>assemble in lobby at<br>21:30. The bus<br>depart at 21:40 for<br>Qinibagh hotel.                | Participants are<br>requested to<br>assemble in lobby<br>at 21:30. The bus<br>depart at 21:40 for<br>Qinibagh hotel.          |

**Live broadcast 现场直播**





| 8月12日<br>星期六                             | 8月13日<br>星期日   | 8月14日<br>星期一  | 8月15日<br>星期二   | 8月16日<br>星期三   |
|--|--|---|--|--|
|  | 入住其尼瓦克酒店的参会者请于8:50在大厅集合，接送巴士9:00出发前往南疆环球港酒店。                           | 入住南疆环球港酒店、其尼瓦克酒店的参会者请于8:50在大厅集合，接送巴士9:00出发前往徕宁酒店。                       | 入住其尼瓦克酒店的参会者请于8:50在大厅集合，接送巴士9:00出发前往南疆环球港酒店。   | 入住南疆环球港酒店、其尼瓦克酒店的参会者请于7:20在大厅集合，接送巴士7:30出发前往阿尔塔什水利枢纽       |
|  | 开幕式<br>(09:50-11:00)<br>集体合影<br>(11:00-11:30)<br>大会报告<br>(11:30-14:00) | 分会场报告<br>(10:00-12:00)<br>茶歇<br>(12:00-12:15)<br>分会场报告<br>(12:15-14:00) | 分会场报告<br>(10:00-11:40)<br>茶歇<br>(11:40-12:00)<br>分会场报告<br>(12:00-14:00)  | 去程<br>(7:30-12:00)<br>科学考察：<br>阿尔塔什水利枢纽工程<br>(12:00-14:00) |
|  | 午餐：<br>南疆环球港国际酒店一层、二层自助西餐厅<br>(14:00-16:00)                            | 午餐：<br>徕宁酒店一层自助西餐厅<br>(14:00-16:00)                                     | 午餐：<br>南疆环球港国际酒店一层、二层自助西餐厅<br>(14:00-16:00)  | 午餐：<br>阿尔塔什食堂<br>(14:00-15:30)                             |
| 注册<br>南疆环球港酒店及其尼瓦克酒店大堂。<br>(14:00-21:00) | 大会报告<br>(16:00-17:40)<br>茶歇<br>(17:40-18:00)<br>大会报告<br>(18:00-19:40)  | 分会场报告<br>(16:00-18:00)<br>茶歇<br>(18:00-18:15)<br>分会场报告<br>(18:15-20:00) | 分会场报告<br>(16:00-18:00)<br>茶歇<br>(18:00-18:20)<br>技术交流<br>(18:20-19:00)<br>执行委员会会议<br>(18:00-19:00)<br>闭幕式<br>(19:00-20:00) | 返程<br>(15:30-20:00)  |
| 晚餐：<br>南疆环球港酒店一层自助西餐厅/其尼瓦克               | 晚宴：<br>南疆环球港酒店二层蘭轩中餐厅，三层崇明、奉贤中   | 晚餐：<br>徕宁酒店一层自助西餐厅<br>(20:00-21:30)                                     | 晚餐：<br>南疆环球港酒店一层、二层自助西餐厅   | 晚餐：<br>南疆环球港酒店一层自助西餐厅<br>(20:00-21:30)                     |

|                                |   |  |   |   |
|--------------------------------|---|--|---|---|
| 酒店一层自助<br>西餐厅<br>(19:30-21:30) | 餐厅<br>(20:00-21:50)                                 |  | (20:00-21:30)                                       |   |
| /                              | 参会者请于 21:50<br>在大堂集合，接送<br>巴士 22:00 出发前<br>往其尼瓦克酒店。 | 参会者请于<br>21:50 在大堂集<br>合，接送巴士<br>22:00 出发前往<br>南疆环球港及其<br>尼瓦克酒店。 | 参会者请于 21:30<br>在大堂集合，接送<br>巴士 21:40 出发前<br>往其尼瓦克酒店。 | 参会者请于 21:30<br>在大堂集合，接送<br>巴士 21:40 出发前<br>往其尼瓦克酒店。 |

**Live broadcast 现场直播**



## VII. Programme / 日程

### Opening ceremony and plenary lecture-13th

**Sunday, August 13, 2023**  
**Nanjiang global port (harbor) international hotel**  
**Shanghai Hall (Third floor)**

| 09:50-11:00 <b>Opening Ceremony</b> Host: Bin Jian (Xinhua Hydropower Co., Ltd.) and Xiaomei Guo (Zhejiang University of Water Resources and Electric Power) |             |                  |  |   |
|--|-------------|------------------|--|---|
| Opening speech: Yanpo Li (Xinhua Hydropower Company Limited)   |             |                  |  |   |
| Opening speech: Yuhong Li (Tsinghua University)  |             |                  |  |   |
| Opening speech: Yongsheng Li (Xinjiang Association for Science and Technology)   |             |                  |  |   |
| Opening speech: Shouqi Yuan (Jiangsu University)   |             |                  |  |   |
| Opening speech: Guangting Chen (Zhejiang University of Water Resources and Electric Power)   |             |                  |  |   |
| Opening speech: François AVELLAN (Leadership team representative of IAHR Committee on Hydraulic Machinery and Systems)                                       |             |                  |  |   |
| Opening speech: Zhengwei Wang (Symposium Chair)  |             |                  |  |   |
| 11:00-11:30 <b>Take Photos</b>   |             |                  |  |   |
| 11:30-14:00 <b>Invited Lectures</b> Host: Daqing Qin (Harbin Electric Machinery Co., Ltd.)   |             |                  |  |   |
| Number   | Time        | Speaker          | Title  | Affiliation/Country                                       |
| IL-1   | 11:30-12:00 | Yanpo Li         | Research on Key Technologies of Hydraulic Turbines and Optimization of Basin Dispatching | Xinhua Hydropower Co., Ltd., China                        |
| IL-2   | 12:00-12:30 | François AVELLAN | Demonstrating Hydropower plants support to the power system flexibility                  | EPFL, Switzerland   |
| IL-3   | 12:30-13:00 | Qiang Yao        | Challenges and opportunities for low-carbon energy transformation in Xinjiang            | Xinjiang University, China                                |
| IL-4   | 13:30-14:00 | Xueshan Liu      | Development achievements and Prospects of Pumped Storage Power Station in China          | China Southern Power Grid Energy Storage Co., Ltd., China |
| 14:00-16:00 <b>Lunch</b>   |             |                  |  |   |
| 16:00-17:55 <b>Invited Lectures</b> Host: Quanwei Liang (Dongfang Electric Machinery Co., Ltd.)  |             |                  |  |   |

|  |             |                  |  |  |
|--|-------------|------------------|--|--|
| IL-5   | 16:00-16:25 | Xavier Escaler   | Development of a Structural Health Monitoring system for hydraulic turbines in the frame of the AFC4 Hydro project | Universitat Politècnica de Catalunya, Spain                      |
| IL-6   | 16:25-16:45 | Daqing Qin       | The Role & Development Direction of Pumped Storage & Conventional Hydro in New Power System                        | Harbin Electric Machinery Co., Ltd., China                       |
| IL-7   | 16:45-17:10 | Christof Gentner | Variable speed pumped storage plants: discussion of design-influencing factors                                     | GE Renewable Energy, Switzerland                                 |
| IL-8   | 17:10-17:30 | Xiaomei Guo      | Key Technologies and Applications of Centrifugal pumps with High Anti-Cavitation Performance                       | Zhejiang University of Water Resources and Electric Power, China |
| IL-9   | 17:30-17:55 | Morten Kjeldsen  | Digitalization in Hydropower- Challenges and Opportunities   | Flow Design Bureau AS., Norway                                   |
| <b>17:55-18:15 Coffee Break</b>  |             |                  |  |  |
| <b>18:15-20:00 Invited Lectures</b> Host: Yong-ho Lee (Korea Maritime & Ocean University, Republic of Korea) |             |                  |  |  |
| IL-10  | 18:15-18:40 | Jin-Hyuk KIM     | Development of a Positive Displacement Hydraulic Turbine for Replacing the PDCV in Water Supply Pipeline System    | Korea Institute of Industrial Technology, Korea                  |
| IL-11  | 18:40-19:00 | Quanwei Liang    | Recent developments and applications of some hydro-techniques in DEC   | Dongfang Electric Machinery Co., Ltd., China                     |
| IL-12  | 19:00-19:25 | Mohamed Farhat   | What do we know on cavitation and its effects on hydraulic machines?   | EPFL, Switzerland  |
| IL-13  | 19:25-19:45 | Chaoshun Li      | Intelligent operation and maintenance technology, equipment, and system for hydropower units                       | Huazhong University of Science and Technology, China             |
| IL-14  | 19:45-20:00 | Zhengwei Wang    | Multiphysics coupling dynamic analysis of hydraulic machinery  | Tsinghua University, China                                       |
| <b>20:00-21:50 Banquet</b>   |             |                  |  |  |

**2023年8月13日，星期日**  
**南疆环球港国际酒店**  
**三层 上海厅**

| 09:50-11:00 <b>开幕式</b> 主持: 简斌 (新华水力发电有限公司) 与 郭晓梅 (浙江水利水电学院) |             |                  |                           |                         |
|---|-------------|------------------|---------------------------|-------------------------|
| 开幕致辞: 李彦坡 (新华水力发电有限公司)                                      |             |                  |                           |                         |
| 开幕致辞: 李宇红 (清华大学)  |             |                  |                           |                         |
| 开幕致辞: 李永晟 (新疆维吾尔自治区科学技术协会)                                  |             |                  |                           |                         |
| 开幕致辞: 袁寿其 (江苏大学)  |             |                  |                           |                         |
| 开幕致辞: 陈光亭 (浙江水利水电学院)  |             |                  |                           |                         |
| 开幕致辞: François AVELLAN (IAHR 水力机械及系统委员会代表)                  |             |                  |                           |                         |
| 开幕致辞: 王正伟 (会议主席)  |             |                  |                           |                         |
| 11:00-11:30 <b>合影</b>                                       |             |                  |                           |                         |
| 11:30-14:00 <b>特邀报告</b> 主持: 覃大清 (哈尔滨电机厂有限责任公司)              |             |                  |                           |                         |
| 编号  | 时间          | 演讲者              | 题目                        | 单位/国家                   |
| IL-1  | 11:30-12:00 | 李彦坡              | 水轮机关键技术及流域调度优化研究          | 新华水力发电有限公司, 中国          |
| IL-2  | 12:00-12:30 | François Avellan | 论证水电站在电力系统灵活性发挥的作用        | 洛桑联邦理工学院, 瑞士            |
| IL-3  | 12:30-13:00 | 姚强               | 新疆低碳能源转型的挑战与机遇            | 新疆大学, 中国                |
| IL-4  | 13:30-14:00 | 刘学山              | 中国抽水蓄能电站的发展成就与展望          | 南方电网储能股份有限公司, 中国        |
| 14:00-16:00 <b>午餐</b>                                       |             |                  |                           |                         |
| 16:00-17:40 <b>特邀报告</b> 主持: 梁权伟 (东方电机股份有限公司)                |             |                  |                           |                         |
| IL-5  | 16:00-16:20 | Xavier Escaler   | AFC4 欧盟项目框架下水轮机健康监测系统的进展  | 加泰罗尼亚理工大学, 西班牙          |
| IL-6  | 16:20-16:40 | 覃大清              | 抽水蓄能及常规水电在新型电力系统中的作用及发展方向 | 哈尔滨电机厂有限责任公司            |
| IL-7  | 16:40-17:00 | Christof Gentner | 影响变转速抽水蓄能电站设计的因素探讨        | GE Renewable Energy, 瑞士 |

|   |             |                 |                            |                                   |
|---|-------------|-----------------|----------------------------|-----------------------------------|
| IL-8  | 17:00-17:20 | 郭晓梅             | 高抗汽蚀性能离心泵关键技术及应用           | 浙江水利水电学院, 中国                      |
| IL-9  | 17:20-17:40 | Morten Kjeldsen | 水电数字化的挑战和机遇                | Flow Design Bureau AS.,<br>Norway |
| 17:40-18:00 茶歇                                |             |                 |                            |                                   |
| 18:00-19:40 特邀报告 主持: Yong-ho Lee (韩国海洋大学, 韩国) |             |                 |                            |                                   |
| IL-10   | 18:15-18:40 | Jin-Hyuk KIM    | 用于取代供水管道系统 PDCV 的容积式水轮机的研制 | 韩国工业技术研究院, 韩国                     |
| IL-11   | 18:40-19:00 | 梁权伟             | 东方电机公司水力技术的最新发展和应用         | 东方电机有限公司, 中国                      |
| IL-12   | 19:00-19:25 | Mohamed Farhat  | 关于空化及其对水力机械的影响, 我们了解什么?    | EPFL, Switzerland                 |
| IL-13   | 19:25-19:45 | 李超顺             | 水电机组智能运行维护技术、设备和系统         | 华中科技大学, 中国                        |
| IL-14   | 19:45-20:00 | 王正伟             | 水力机械多场耦合动力特性分析             | 清华大学, 中国                          |
| 20:00-22:00 晚宴                                |             |                 |                            |                                   |

全体会议报告大意线上翻译 (耳机自备)

腾讯会议 ID: 492-639-303

**Parallel session 1-Pump turbines 水泵水轮机-14th**

**Monday, August 14, 2023 (2023年8月14日星期一)**

**Laining hotel (徠宁酒店)**

**Hong Kong Hall (香港厅) -5<sup>th</sup> floor**

| 10:00-12:00 Session: Pump-turbines 水泵水轮机 Chair: Yongguang Cheng (Wuhan University) |             |   |  |
|--|-------------|---|--|
| Paper ID   | Time/时间     | Paper Title / 题目  | Paper Authors / 作者   |
| 130  | 10:00-10:15 | The influence of the S shaped characteristics of high head pump-turbine on the minimum pressure of draft tube <b>(OL)</b>                     | ZHANG Meiqin, SU Yanyi, CHEN Jianfu,, ZHANG Shubang, WANG Wei, WEI Xianzhu |
| 132  | 10:15-10:30 | The model test research of medium-low specific speed Francis pump-turbine <b>(OL)</b>   | Y F Guo, Q B Guo, Z L Liu  |
| 36   | 10:30-10:45 | Numerical study on valve closing criterion During Pump-turbine Start-up on Pump Mode  | Lingfeng Shu, Yinxia Zheng, Zhongwei He, Jie Fang, Chengjun Li             |
| 37   | 10:45-11:00 | Pressure Fluctuation analysis of pump-turbine in turbine mode under the same head condition   | Fangfang Zhang, Na Li, Ruofu Xiao, Ran Tao                                 |
| 71   | 11:00-11:15 | Suppression mechanism of transient pressure during the turbine runaway of an ultra-high head pump-turbine                                     | Xiaolong Fu, Jingwei Lv, Deyou Li, Hongjie Wang, Daqing Qin, Xianzhu Wei   |
| 123  | 11:15-11:30 | Evolution of Runner Forces during Simultaneous Pump-trip Transient process of Two Pump-turbines   | Liu Ke, Cheng Yongguang, Ding Jinghuan, Wang Xi                            |
| 145  | 11:30-11:45 | Spatial distribution of rigid vorticity in pump-turbine under turbine mode with different guide vane openings                                 | X T YAN, K Kan, Y ZHENG, H X CHEN  |
| 106  | 11:45-12:00 | Three-Dimensional Numerical Simulation of Pumped Storage Unit No-Load operation with PID control before Grid-Connected                        | Junxun Guo, Daqing Zhou  |
| <b>12:00-12:15 Coffee Break</b>  |             |   |  |
| 12:15-14:00 Session: Pump-turbines 水泵水轮机 Chair: Yongguang Cheng (Wuhan University) |             |   |  |
| 81   | 12:15-12:30 | Research and application of Qingyuan pumped-storage power station multi units control strategy during simultaneous load rejection <b>(OL)</b> | Bushi Zhao, Yumin Peng, Yixi Luo, Hao Zhang, Fanqi Huang                   |

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|---|-------------|--|---|
| 131   | 12:30-12:45 | Analysis of the cause of the 40Hz frequency component in spiral casing of a high head pump turbine                                   | W B Jia, Z W Guan, Q W Liang, Y Liu, Z N Wang, H Cheng, Q Y He  |
| 147   | 12:45-13:00 | Analysis of self-oscillation stability of pump-turbine in the S-shaped regions of characteristic curves                              | X W Chen, X Lai, H Y Chen, Y F Lin, K Liu, Y G Cheng  |
| 154   | 13:00-13:15 | Cause Analysis and Mitigation Measures of Vertical Vibration of Head-Cover of a Pump-Turbine   | Chen Hongyu, Lin Yunfa, Li Kaiming, Zhang Chao, Zhou Zan, Cheng Yongguang                                       |
| 159   | 13:15-13:30 | Prediction Model for the S-shaped Characteristics of Pump-Turbines and its Application on Runner Design                              | Zanao Hu, Yongguang Cheng, Demin Liu, Hongyu Chen   |
| <b>14:00-16:00 Lunch</b>  |             |  |   |
| <b>16:00-18:00 Session: Pump-turbines</b> 水泵水轮机 Chair: Lei Han (Harbin Institute of Technology) |             |  |   |
| 193   | 16:00-16:15 | Numerical study of rotor-stator interaction in variable speed reversible pump-turbine in turbine mode at low head <b>(OL)</b>        | B R Rode, A Kumar, C Segoufin, Y Laurant  |
| 166   | 16:15-16:30 | Study on the effect of pressure-balance pipe diameter on the volumetric efficiency of pump turbine <b>(OL)</b>                       | Yue Lv, Zhengwei Wang, Lingjiu Zhou   |
| 171   | 16:30-16:45 | Three-dimensional simulations of load rejection processes of a variable-speed pump-turbine under different initial rotational speeds | Z Y Yang, L J Gong, H Fang, X F Deng, Y H Li, T T Liao  |
| 7   | 16:45-17:00 | Study of axial hydraulic thrust and radial force characteristics of a variable speed pump-turbine unit                               | Lei Wang, Shuang Yu, Linmin Shang, Jingwei Cao, Zhengwei Wang, Xiaobing Liu                                     |
| 181   | 17:00-17:15 | Multi-objective optimal scheduling of multi-energy combined system considering accurate modeling of pumped storage hydropower        | Ganggang Liang, Hao Zhang, Pengcheng Guo  |
| 184   | 17:15-17:30 | Analysis of stability characteristics of pump-turbine in a pumped-storage power station with large head variation                    | Li Chengjun, Wang Delou, Zhao Zhiwen, Xiao Liangyu, Chen Shunyi, Gu wenbin, Dai Ran, Liu Yanhong                |
| 163   | 17:30-17:45 | Variations of flow patterns and pressure pulsations in variable speed pump-turbine during start-up process                           | Pengcheng Zhang, Yongguang Cheng, Demin Liu, Jinsheng Zheng, Guofeng Li   |
| 6   | 17:45-18:00 | Study on the influence of "S" characteristic of reversible water pump turbine on its stability                                       | Qin Qianfeng, Cai Weijiang, Tao Yingxin, Ding Kechengqi, Zhang Hangrui, Zou Yanze, Zhang Shiqi, Guan Diyu, Ning |



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|   |             |  | Zhongli   |
| <b>18:00-18:15 Coffee Break</b>   |             |  |   |
| <b>18:15-20:00 Session: Pump-turbines</b> 水泵水轮机 Chair: Lei Han (Harbin Institute of Technology) |             |  |   |
| 235   | 18:15-18:30 | Analysis of flow characteristics of pump turbine under transient conditions of 75% load rejection                            | Qiang Zhao, Faye Jin, Jiali Cao, Huanyu Wu, Yongyao Luo   |
| 241   | 18:30-18:45 | Model experimental study on special frequency of hydraulic pump working condition headcover for ultra-high head pump-turbine | F Z Lin, X L Wang, Z W Guan, J Y Hu, Z N Wang, Q W Liang  |
| 262   | 18:45-19:00 | Numerical study on the performance characteristics of a high-head pump turbine based on the GEKO model                       | L He, Z X Gao, L C Zhao, L He, W P Wang, L Meng, C L Liao |
| 202   | 19:00-19:15 | The pump turbine hydraulic performance research, model test and operation in Yangjiang pumped storage power station          | Yang Xiaolong, Wang Huanmao, Liu Ming, Wang Chao          |
| 17  | 19:15-19:30 | State of the art of technical background and practicality of pressure balance tubes for pumped storage turbine               | Haoyang Wang, Yifeng Zhao, Huan Wei, Jun Qin, Fei Zhang   |
| <b>20:00-22:00 Dinner</b>   |             |  |   |

**线上会场 Online connections:**

腾讯会议 Tencent Meeting (VooV Meeting):

ID: 869495262

Microsoft Teams:

ID: 953 904 737 014 6

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**Parallel session 2-Pumps 泵-14th****Monday, August 14, 2023 (2023年8月14日星期一)****Laining hotel (徠宁酒店)****Shang Hai Hall (上海厅) -5<sup>th</sup> floor**

| 10:00-12:00 Session: Pumps 泵 Chair: Lei Tan (Tsinghua University) |             |  |   |
|---|-------------|--|---|
| Paper ID  | Time/时间     | Paper Title / 题目   | Paper Authors / 作者  |
| 210   | 10:00-10:15 | Investigation on flow structure and pressure fluctuation of gas-liquid two-phase flow in a mixed flow pump           | Guoying WU, Yadong HAN, Yuanhang LIN, Lei TAN                                   |
| 212   | 10:15-10:30 | Study on impeller pulsation and fluid-structure coupling characteristics of guide vane type mixed flow pump          | Yan Jin, Ying Xue, Fangping Tang  |
| 222   | 10:30-10:45 | Expression and prediction of pump and pumping station characteristics  | Dengfeng Yan, Xusong Feng, Yanjun Li, Weigang Lu, Songshan Chen                 |
| 225   | 10:45-11:00 | Research on the temperature field of a horizontal reactor coolant pump canned motor                                  | X H Chen, R Xu, J Q Lu1, B Gong, D Z Wang                                       |
| 226   | 11:00-11:15 | Optimization of Cavitation Performance of High-Speed Centrifugal Pump Based on the Meta-Model of optimal Prognosis   | Xiao-hui WANG, Kai ZHANG, Sen-chun MIAO, Jun-hu YANG, Zheng-jing SHEN           |
| 231   | 11:15-11:30 | Analysis of cavitation pressure fluctuation of mixed flow pump based on welch power spectrum                         | Wentao Xu, Li Cheng, Weixuan Jiao, Can Luo                                      |
| 238   | 11:30-11:45 | Cavitation Performance Analysis and Optimal Design of The Portable Electric-Driven Axial Flow Pump                   | Ding Tian, Rong Lu, Han Zhu, Yong Zhang, Guangjuan Wei, Gangyuan Li, Qiaorui Si |
| 243   | 11:45-12:00 | Numerical simulation of start-up and shutdown transition process of super large flow and high-power centrifugal pump | Guosheng Xia, Anting Ma, Xuechu Zhao, Honggang Fan, Yu Xu                       |
| 12:00-12:15 Coffee Break  |             |  |   |
| 12:15-14:00 Session: Pumps 泵 Chair: Lei Tan (Tsinghua University) |             |  |   |

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| 244  | 12:15-12:30 | Characteristic Analysis of Pressure Fluctuation of the super large flow and high-power centrifugal pump during transient process of the start-up and shutdown | Shuai Liu, Anting Ma, Xuechu Zhao, Honggang Fan, Yu Xu                                     |
| 247  | 12:30-12:45 | Study on the volute optimization and mechanism of vortex loss reduction for a centrifugal fan   | Wei Wang, Junlong Wang, Tingting Cu, Lefu Zhang, Jinlin Lu, Jianjun Feng, Xingqi Luo       |
| 250  | 12:45-13:00 | Research progress on hydraulic performance prediction method for large dredge pumps   | Lei Cao, Tao Guo, Haifei Zhuang, Jingzhao Hu   |
| 251  | 13:00-13:15 | Rapid design method of centrifugal pump impeller based on machine learning  | Yun Fei Chen, Yu Long, Wei Li, Leilei Ji, Shuo Li, Hao ming Li                             |
| 253  | 13:15-13:30 | Experimental and numerical study on erosive wear in a dredge pump impeller  | T Guo, W Wang, L Cao, J Xing   |
| 255  | 13:30-13:45 | Structural improvement of a dredge pump based on numerical analysis to prolong its service life   | J Hu, L Cao, T Guo, Z Zhu, Y Wu  |
| 14:00-16:00 <b>Lunch</b>   |             |   |  |
| 16:00-18:00 <b>Session: Pumps</b> 泵 Chair: Xiaomei Guo (Zhejiang University of Water Resources and Electric Power) |             |   |  |
| 327  | 16:00-16:15 | Numerical Study on the Hysteresis Effect of Volute Pump with Stay Vanes Based on Vortex Dynamics <b>(OL)</b>  | Y Y Su, X D Wu, B Xu, J H Feng, T P Zheng, Y Y Liu   |
| 34   | 16:15-16:30 | Research on Radial Force of the Volute Pump with Stay Vanes at Medium-high Specific Speed <b>(OL)</b>   | G Zhang, J H Feng, Y Y Su, X D Wu, G Y Zeng, T Zhang                                       |
| 271  | 16:30-16:45 | Design method and flow analysis of a mixed flow pump based on blade load control  | Demin LIU, Yangping LU, Lei TAN, Ruoyu TANG, Ming YAN, Zhichao WANG, Xiaoli DING           |
| 328  | 16:45-17:00 | The influence of the gap width of the blade on the performance of the mixing pump   | Y F Xing, R N Li, W Y Zhang, T Q Xue, Y Y Hou, L L Zhao, L Bai, T Yang, Y B Yang, Y F Dong |
| 334  | 17:00-17:15 | Analysis of axial forces pulsation in an high-pressure decoking pump  | Yanpi Lin, Shengjun Xu, Zhandong Chen, Xiaojun Li, Zhuchao Zhu                             |
| 336  | 17:15-17:30 | Development of Wide Head Variation Pump for Liyuzhou Pump Station   | Gong Rangqin, Zhang Guang,   |

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|  |             |   | Chen Jianfu, Tian Xinwen, Xu Hongguang   |
| <b>18:00-18:15 Coffee Break</b>  |             |   |  |
| <b>18:15-20:00 Session: Pumps</b> 泵 Chair: Xiaomei Guo (Zhejiang University of Water Resources and Electric Power) |             |   |  |
| 350  | 18:15-18:30 | Influence of offset blade on pressure fluctuation in a centrifugal pump under different conditions                                      | Yi Zhang, Guoping Li, Changsheng Chen, Zhenlai Ma, Biwen Chen, Bo Gao, Yangping Lu, Yuhan Gao, Lei Tan |
| 366  | 18:30-18:45 | Research on the pitching hydrodynamic performance of pump-jet propelled submersible   | W Han, Y Y Hou, T Zhang, Y F Dong, Y F Xing, Y B Yang, L Bai, Y K Zhang, T Yang, L L Zhao, T Q Xue     |
| 54   | 18:45-19:00 | The Influence of Blade Wrap Angle on the Internal Flow Field and Hydraulic Performance of Double-Suction Pumps for Yellow River Pumping | L M Yan, W Han, Y P Tian, X Yang, J P Zhou   |
| 63   | 19:00-19:15 | Rotor-Dynamic Study for High Pressure Multistage Centrifugal Pump   | X F Liu, W S Ma, J D Su, F Xiao, M Z   |
| 84   | 19:15-19:30 | Transient vortical structure evolution under part-load condition in a high-power double-suction centrifugal pump based on Liutex method | Qifan Deng, Ji Pei, Wenjie Wang  |
| 85   | 19:30-19:45 | Effect of airfoil trailing edge up on the performance of gas-liquid multiphase pumps  | Haozhi Nan, Wei Han, Rennian Li  |
| <b>20:00-22:00 Dinner</b>  |             |   |  |

**线上会场 Online connections:**

腾讯会议 Tencent Meeting (VooV Meeting):  
ID: 594-352-982

**Parallel session 3-Pump turbines 水泵水轮机-14th****Monday, August 14, 2023 (2023年8月14日星期一)****Laining hotel (徠宁酒店)****Macao Hall (澳门厅) -5<sup>th</sup> floor**

| 10:00-12:00 Session: Pump-turbines 水泵水轮机 Chair: Christof Gentner (GE Renewable Energy) |             |   |  |
|--|-------------|---|--|
| Paper ID   | Time/时间     | Paper Title / 题目  | Paper Authors / 作者   |
| 297  | 10:00-10:15 | Preliminary study on power regulation rapidity in pump mode of variable-speed pumped storage unit with DFIM   | Yuanhong Liu, Weijia Yang, Jin Yang, Yifan Huang, Zixuan Shao  |
| 298  | 10:15-10:30 | Redesign of Adjustable Guide Vane Cascades of Pump Turbine and Its Effect on Self-Excited Vibrations at Slight Opening During Pump Mode's Starting Up Process | Z J Hao, M K Wang, Q Y He, Q H Shi, H Chen and X L Ding  |
| 299  | 10:30-10:45 | Study on vibration characteristics of pump turbine with different runner characteristics  | Hailing Li, Shaocheng Ren, Yang Liu  |
| 300  | 10:45-11:00 | Experimental study on simultaneous load rejection of dual pumped storage units  | Shaohua Wang, Guohu Luo, Jie Qu, Jie Wu, Yang Liu, Mingjun Sun   |
| 31   | 11:00-11:15 | Effect of guide vane closing speed deviation on transition process in pumped storage power plant  | Dongkuo Li, Fei Zhang, Jinbing Ni, Yifeng Zhao, Zhonghua Gui, Jinghuan Ding and Wenfu Han                  |
| 312  | 11:15-11:30 | Optimal design of in-hole turbine generator based on numerical simulation   | Hui Quan, Jun Sun, Xiaoze Zhang  |
| 320  | 11:30-11:45 | Numerical Investigation on Influence of Guide Vane Shape on Rotor-Stator Interaction of a Reversible Prototype Pump-Turbine                                   | Yang Haixia, Yang Mengqi, Jia Yalin, Peng Yu, Bi Huili, Wang Zhengwei                                      |
| 326  | 11:45-12:00 | Study on dynamic stress variation of head cover bolt during transient operation of pump turbine   | Liu Chen, Hailing Li, Mei Huang, Yang Liu, Shaocheng Ren, Jinwei Li, Mingli Jiang, Mingjun Sun, Weihua Cao |
| 12:00-12:15 Coffee Break   |             |   |  |
| 12:15-14:00 Session: Pump-turbines 水泵水轮机 Chair: Christof Gentner (GE Renewable Energy) |             |   |  |

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| 333  | 12:15-12:30 | A Field Test Study on the Instability of a Pump-Turbine under Turbine Mode  | X H Song, M Xia, H P Hu, W Q Zhao, Z W Wang                              |
| 95   | 12:30-12:45 | Calibration of Flow Differential Pressure Coefficients on Pump-Turbine by Thermodynamic Method  | Wenkui Zhang, Hongyi Xu, Wei Liu, Xinwen Hu, Juan Liu                    |
| 345  | 12:45-13:00 | Optimization analysis of head cover structure of high head pump turbine   | Zhang Hong, Huang Shihai, Zhou Junpeng, Song Min, Song Weibin, Ma Yanmei |
| 351  | 13:00-13:15 | Numerical analysis of inner flow characteristic for the pump turbine at part load condition   | Wei Wang, Miao Guo, Weiqiang Zhao, Chao Xu, Zhengwei Wang                |
| 359  | 13:15-13:30 | Research on Dynamic Stress Testing and Fatigue of Head Cover Bolt in High Head Pumped Storage Unit  | Du Xuan, Fan Yangming, Wang Shijian, Tang Qin, Zhou Junpeng              |
| 363  | 13:30-13:45 | Vibration Characteristics Analysis of Pump-turbine head cover based on Fluid-Solid Coupling   | J P ZHOU, Y M FAN, Q Y HE, S J WANG, H L ZHAO, F SUN, Q TANG             |
| 148  | 13:45-14:00 | Numerical investigation on the spatiotemporal correlation between hydraulic loss and vortex at turbine mode of a pump-turbine                         | Qizheng Ma   |
| <b>14:00-16:00 Lunch</b>   |             |   |  |
| <b>16:00-18:00 Session: Pump-turbines 水泵水轮机 Chair: Deyou Li (Harbin Institute of Technology)</b> |             |   |  |
| 368  | 16:00-16:15 | Study on the influence of guide vane - blade number matching relationship (20-9) on the phase resonance risk coefficient of pumped storage units      | Tao Zhang, Jinwei Li, Weibin Yang, Yanyan Liu                            |
| 372  | 16:15-16:30 | Numerical simulation on the flow characteristics of a pump-turbine in load rejection process  | Jingwei Cao, Xin Liu, Chongji Zeng, Zhengwei Wang                        |
| 51   | 16:30-16:45 | Commissioning Problem Analysis and Solution Strategy for Pump Turbine at Dun Hua Pumped Storage Power Station   | Qu Yang, Bu Liangfeng, Gong Rangqin, Liang Jinbo, Gao Xin                |
| 77   | 16:45-17:00 | Numerical investigation on the spatiotemporal correlation between hydraulic loss and vortex at turbine mode of a pump-turbine                         | Y L Qin, D Y Li, H J Wang, Z S Liu, X Z Wei, X H Wang, Y J Song          |
| 93   | 17:00-17:15 | Temperature prediction for technical water supply systems in pumped storage power plants based on random forest downscaling and improved LSTM methods | YUAN Jing, ZHANG XIN, FANG JIE, ZHENG Xiaonan                            |

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| 340  | 17:15-17:30 | Influence of upper crown clearance thickness on axial force of high-head pump turbine   | L Li, D Yan, X Liu, W Zhao, Y Wang, Z Wang  |
| 390  | 17:30-17:45 | Vibration of Civil Structure and Regional Environment Caused by Dynamic and Static Interference of Pump Turbine in Pumped Storage Power Station | J X Zheng, P Liu, Q W Liang, S C Ren  |
| 18:00-18:15 <b>Coffee Break</b>  |             |   |   |
| 18:15-20:00 <b>Session: Pump-turbines</b> 水泵水轮机 Chair: Deyou Li (Harbin Institute of Technology) |             |   |   |
| 268  | 18:15-18:30 | Vibration and noise of a high head pump turbine: analysis and improvement   | Z W Guan, W B Jia <sup>1,2</sup> , Z J Leng, J Chen, Z N Wang, Q Y He, Q W Liang                  |
| 282  | 18:30-18:45 | Study on load rejection test of pumped storage units  | Guohu Luo, Xi Wang, Wenjun Zhao, Shaozheng Huang, Jinwei Li                                       |
| 284  | 18:45-19:00 | Study on phase resonance risk coefficient of pumped-storage units   | Tao Zhang, Jinwei Li, Weibin Yang, Yanyan Liu   |
| 387  | 19:00-19:15 | Technical investigation of the ternary pumped storage hydro units with ultra-high-water head  | Li Dongkuo, Liu Zishi, Gui Zhonghua, Xiao Wei, Min Hongping, Wang Xiaodong, Lin Hao, Xiao Yexiang |
| A-124  | 19:15-19:30 | Multi-objective optimization design of in-hole turbine generator based on load distribution   | Sun Jun   |
| 178  | 19:30-19:45 | The method for identifying the potential of the fast response capability of a variable-speed pumped storage turbine in pump mode                | L Meng, Y Zheng, X Wang, C Y Zhang, Y J Tian, L He  |
| 20:00-22:00 <b>Dinner</b>  |             |   |   |

**Parallel session 4-Pumps 泵-14th**

**Monday, August 14, 2023 (2023年8月14日星期一)**

**Laining hotel (徠宁酒店)**

**Shan Xi Hall (陕西厅) - 6<sup>th</sup> floor**

| 10:00-12:00 Session: Pumps 泵 Chair: Yonggang Lu (Jiangsu University) |             |   |  |
|--|-------------|---|--|
| Paper ID   | Time/时间     | Paper Title / 题目  | Paper Authors / 作者   |
| 2  | 10:00-10:15 | Simulation analysis of runaway process of tubular pump and comparison of site test  | He Zhongwei, Shu Linfeng Li Chengjun                                       |
| 27   | 10:15-10:30 | Numerical investigation on slip velocity characteristics of gas-liquid two-phase flow in a multiphase pump under different blade tip clearance          | Chenhao Li, Xitong Wu, Xingqi Luo, Jianjun Feng, Guojun Zhu, Xiaohang Wang |
| 43   | 10:30-10:45 | Analysis of blade outlet edge inclination angle on the flow field and hydraulic performance of double-suction centrifugal pump for Yellow River pumping | Z Y Gu, W Han, J H Sun, C P He, X Yang, Y J Hao, Z T Xu, T Yang            |
| 50   | 10:45-11:00 | Numerical Investigation on internal flow characteristics of a mixed-flow pump with Tandem malposed blades   | Li Chenhao, Luo Xingqi, Wu Xitong, Zhu Guojun, Wang Like, Wang Xiaohang    |
| 62   | 11:00-11:15 | Research on the effect of anti-guide vane inlet Angle on the performance of multistage centrifugal pump   | Li Chenhao, Li Lu, Luo Xingqi, Wu Xitong, Zhu Guojun, Feng Jianjun         |
| 65   | 11:15-11:30 | Effect of Blade Thickening Law on the Internal Flow Field and Hydraulic Performance of Double Suction Pumps for Yellow River Pumping                    | Xiang Yang, Li Rennian, Yaping Tian, Juping Zhou, Shiqi Yang               |
| 142  | 11:30-11:45 | Numerical study on flow-induced vibration of a high-pressure jet water pump on a dredger and corresponding impeller optimization                        | Jingzhao Hu, Lei Cao, Haifei Zhuang  |
| 72   | 11:45-12:00 | Coherent structures decomposition of internal flow in the double-suction centrifugal pump impeller  | Wenlu Zhang, Shuwen Deng, Tao Wang, Bo Jiang, Yuchuan Wang                 |
| 12:00-12:15 Coffee Break   |             |   |  |
| 12:15-14:00 Session: Pumps 泵 Chair: Yonggang Lu (Jiangsu University) |             |   |  |



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|--|-------------|--|---|
| 87   | 12:15-12:30 | Analysis of Flow Fluctuation of Confined Backward-Facing Step Based on Pulsation Tracking Network Method                         | Q Liu, J H Lu, J L Pan1, W L Guang, D Zhu, R Tao                        |
| 179  | 12:30-12:45 | Research on hump characteristics improvement of low-mid specific speed high-power centrifugal pump                               | Yang Zheng, Long Meng, Yajuan Tian, Xin Wang, Chiye Zhang, Yuhang Chen  |
| 200  | 12:45-13:00 | Influence of impeller energy dissipation characteristics of multi-blade axial flow pump impeller by the cascade density          | ZHAO Sen, YANG Congxin, GUO Yanlei, Mo Yingxiang, Cui Haoyu, LV Tianzhi |
| 103  | 13:00-13:15 | Investigation of flow-induced sound source generation in a centrifugal pump  | Zhiyi Yuan, Yongxue Zhang, Wenbo Zhou, Jinya Zhang, Jianjun Zhu         |
| 110  | 13:15-13:30 | Numerical Investigation of Impeller Parameters on the Performance and Internal Flow Characteristics in Regenerative Flow Pumps   | Deli Tang, Yi Lu, Qianqian Li, Jian Ge, Xinting Miao                    |
| 113  | 13:30-13:45 | Design and Performance Prediction of Vortex Pump Based on CFD for High Concentration Sludge Dredging (OL)                        | H F Zhuang, M M Liu, L Cao  |
| 14:00-16:00 <b>Lunch</b>   |             |  |   |
| 16:00-18:00 <b>Session: Pumps</b> 泵 Chair: Xun Sun (Shandong University) |             |  |   |
| 116  | 16:00-16:15 | Numerical Simulation of Solid-Liquid Two-Phase Flow in Pump  | Guosheng Xia, Haili Zhang, Yang Zhang, Wei Jiang, Honggang Fan          |
| 120  | 16:15-16:30 | Study on the coupling characteristics of vertical unit and plant of large underground pumping station for water transfer project | Shaopeng Lu, Tao Wang, Haili Zhang, Yuchuan Wang, Honggang Fan          |
| 121  | 16:30-16:45 | Analysis of the Bubble Diameter Effect on the Gas-liquid Flow Characteristics of a Multiphase Rotodynamic Pump                   | Zhihao Li, Wenwu Zhang, Baoshan Zhu, Jiaying Lu, Haoru Zhao             |
| 127  | 16:45-17:00 | A stability study based on the operation of rotor pumps at different speeds  | Hui Quan, Ziying Gu, Houde Shu  |
| 133  | 17:00-17:15 | Validation of steady and unsteady numerical simulations based on an axial flow pump  | Duc-Anh Nguyen, Sung Kim, Soon-Young Jeong, Jin-Hyuk Kim                |
| 141  | 17:15-17:30 | Study on the form of sealing ring and its sealing characteristics of centrifugal pump (OL)                                       | Na Yan, Xiaohang Wang, Xidong Wu, Jiwen Zhu                             |
| 158  | 17:30-17:45 | Optimization of Centrifugal Pump Impeller Based on Neural Network and NSGA-II Algorithm (OL)                                     | Chen Wei, Ma Wensheng, Wang Lei, Zhang Meng, Zhang Qiang1 and Huo       |

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| 18:00-18:15 <b>Coffee Break</b>  |             |   |   |
| 18:15-20:00 <b>Session: Pumps</b> 泵 Chair: Xun Sun (Shandong University) |             |   |   |
| 70   | 18:15-18:30 | Numerical and experimental study of tip leakage vortex structures and dynamics in a mixed-flow waterjet pump                          | B Gong, H L Zhu, X H Chen, J L Yin, N Li, D Z Wang                    |
| 182  | 18:30-18:45 | The Influence of Different Inlet Water Flow Rotation on the Hydraulic Performance of Low Hump Outlet Conduit                          | Lei Xu, Tao Jiang, Weigang Lu   |
| 186  | 18:45-19:00 | The Study of Using the Inducer to Improve the Cavitation Performance of a Centrifugal Pump  | L L Ma, C Wang, Y Chen, B H Wang, D H Yu, Y C Yang                    |
| 191  | 19:00-19:15 | Study of the effect of incoming flow with fluctuating gas void fraction on transient characteristics of a three-stage multiphase pump | Zheng Tan, Jinya Zhang, Wenbo Zhou, Yongxue Zhang                     |
| 192  | 19:15-19:30 | Numerical simulation of unsteady cavitation at the tongue of a centrifugal pump   | Wenbo Zhou, Yongxue Zhang, Zhiyi Yuan, Jianjun Zhu, Zheng Tan         |
| 203  | 19:30-19:45 | Numerical investigation of cavitation suppression of centrifugal pump based on the bionic humpback whale blade                        | L K Wang, C Liang, X Q Luo, X Q Luo, H Xie, G J Zhu, J J Feng, C H Li |
| 20:00-22:00 <b>Dinner</b>  |             |   |   |

**线上会场 Online connections:**

腾讯会议 Tencent Meeting (VooV Meeting):  
ID: 516532704

**Parallel session 5-Storage Pumps 蓄能泵-14th**

**Monday, August 14, 2023 (2023年8月14日星期一)**

**Laining hotel (徠宁酒店)**

**Gui Zhou Hall (贵州厅) - 6<sup>th</sup> floor**

| 10:00-12:00 Session: Storage Pumps 蓄能泵 Chair: Huan Cheng (Dongfang Electric Machinery Company Limited)        |                    |   |  |
|---|--------------------|---|--|
| Paper ID  | Time/时间            | Paper Title / 题目  | Paper Authors / 作者   |
| <b>Invited Lecture</b>  | <b>10:00-10:30</b> | <b>Technology for flexible operation: the variable speed pumped turbine in Chunchangba PSP—the first full-size frequency converter VSU in China</b>             | <b>Long Meng</b> (China Institute of Water Resources and Hydropower Research, China) |
| 302   | 10:30-10:45        | Electromagnetic design and analysis of super-capacity high-speed pumped storage unit  | Tao Liu, Hai Huang, Kai Lin, Zan Zhou, Liang Liu                                     |
| 303   | 10:45-11:00        | Analysis on turning and swing adjustment of super-high head, large capacity and high speed pumped storage unit  | Tao Liu, Qian Peng, Fei Ye, Xie Zhang, Jingwei Sun                                   |
| 304   | 11:00-11:15        | Study on ventilation and cooling technology of super-large capacity high speed storage unit   | Liang Shi, Xiaofeng Yu, Tao Liu, Zhengxin Cao  |
| 205   | 11:15-11:30        | Research on diffusion flow characteristics of water inlet/outlet of side pumped storage power station   | Yueyang Zheng, Dongyun Guo, Jie Wei  |
| 281   | 11:30-11:45        | Analysis and Discussions on High Insulation Performance of 20 kV Generator Motor Stator in the Large Pumped Storage Unit  | Z Zhou, T Liu, H Y Chen, Z X Cao, H C Li   |
| 12  | 11:45-12:00        | Research on multi-condition and multi-objective control of pumped storage unit optimized by improved multi-objective particle swarm optimization algorithm (OL) | Xiaoping Jiang, Tianning Xiu, Hao Yu   |
| <b>12:00-12:15 Coffee Break</b>   |                    |   |  |
| <b>12:15-14:00 Session: Storage Pumps 蓄能泵 Chair: Huan Cheng (Dongfang Electric Machinery Company Limited)</b> |                    |   |  |
| 61  | 12:15-12:30        | Research and Application of Key Technologies for Ultra High Pressure Grouting of Yangjiang Pumped Storage Power Station in Guangdong Province (OL)              | Yunli Shi, Xueshan Liu, Yufei Huang, Yueyang Zheng, Yuezhi Wang                      |
| 75  | 12:30-12:45        | Analysis and Application of Suppression Measures for Protection   | J J Dong, T Yu, C J Chen, Y D  |

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|  |             | Misoperation Caused by Excitation Inrush Current of 15.75kV Transformer <b>(OL)</b>   | Huang, S H Zhong  |
| 101  | 12:45-13:00 | Talking about the impact of digital twins on the construction of pumped storage power stations <b>(OL)</b>  | Liang Liu, Zan Zou, Zhengxin Cao, Xie Zhang   |
| 102  | 13:00-13:15 | Analysis and treatment about Temperature Rising and Thermal stability of Guide Bearing of Hydraulic Power Unit <b>(OL)</b>  | Zhiqiang Wang, Hongyu Chen, Songwei Zhang, Liang Liu, Zan Zhou  |
| 170  | 13:15-13:30 | Practice of first water filling operation of super-high head diversion channel in YangJiang storage power station <b>(OL)</b>   | Peijiang Zhen, Mingzhi Cai, Le Wang   |
| 287  | 13:30-13:45 | A Mechanism for Efficiently Controlling the Safety Risks of Pumped Storage Power Station Construction <b>(OL)</b>   | H B Wang, Z J Zhang   |
| 288  | 13:45-14:00 | A Grounding Resistance Monitoring Technique for Improved Construction Electricity Safety in Pumped Storage Power Station <b>(OL)</b>                                    | H B Wang, Z J Zhang   |
| <b>14:00-16:00 Lunch</b>   |             |   |   |
| <b>16:00-18:00 Session: Storage Pumps 蓄能泵</b> Chair: Zhigang Zuo (Tsinghua University) |             |   |   |
| 292  | 16:00-16:15 | Pumped Storage Hydropowers Network Planning: A Theoretical and Technical Review   | Haoxing Yu, Yine Chen   |
| 25   | 16:15-16:30 | Prediction of residual breakdown voltage of main insulation of generator stator bars based on BP neural network   | Xiangdong Liu, Hang Yang, Liangliang Nie, Qing Li, Peng Ling, Yakang Zhao, Yaling Jia, Weiyu Wang, Junjie Dong, Yao Jin, Haiyun Jin |
| 189  | 16:30-16:45 | Research and Application of Reliability-centered Maintenance Strategy for pumped storage unit   | Xiaofeng Huang, Wei Huang   |
| 194  | 16:45-17:00 | Research and Application of fixed value setting optimization of generator circuit breaker failure protection of pumped storage power station                            | Jianwei Zhou, Wei Huang, Dehua Li   |
| 314  | 17:00-17:15 | Research and Application on optimization of intensive management mode of operation to meet the rapid development of pumped storage under carbon peak and neutralization | Wei Huang, Dehua Li   |
| 318  | 17:15-17:30 | Research and Application of operation mode of centralized control center  | Dehua Li  |

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|  |             | of multiple pumped storage power stations   |   |
| 283  | 17:30-17:45 | Analysis and research on the influence of stress relief structure on the grouting hole weld of hydraulic and hydropower penstock <b>(OL)</b>                      | Zhengxin Cao, Feng Yang, Xie Zhang, Zan Zhou, Liang Liu |
| <b>17:45-18:15 Coffee Break</b>  |             |   |   |
| <b>18:15-20:00 Session: Storage Pumps</b> 蓄能泵 Chair: Zhigang Zuo (Tsinghua University) |             |   |   |
| 69   | 18:15-18:30 | Research and application of individual emergency device for the SCADA system of hydropower station <b>(OL)</b>  | Yan Liang, Mingzhi Cai, Peijiang Zhen, Zhanjun Guo      |
| 78   | 18:30-18:45 | Optimization and Improvement of Three-phase Asynchronous Motor Soft Starter Control Circuit <b>(OL)</b>   | Yao Jin, Junjie Dong, Xiongwei Yang                     |
| 164  | 18:45-19:00 | Research on hydraulic characteristics' sensitivity analysis of the hydraulic inclined shaft turning <b>(OL)</b>   | Xuan Zhang, Jie Wei, Han Wu, Lu Zhao                    |
| 165  | 19:00-19:15 | The layout design of water diversion system in Zhaoqing Langjiang Pumped Storage Power Station based on front well drill method <b>(OL)</b>                       | Jingwei Sun, Han Wu, Lu Zhao, Yan Shi                   |
| 59   | 19:15-19:30 | Thoughts on the transformation and development of mechanized and intelligent construction of pumped storage power stations under the dual carbon goal <b>(OL)</b> | Xueshan Liu, Yufei Huang, Yunli Shi, Yueyang Zheng      |
| <b>20:00-22:00 Dinner</b>  |             |   |   |

### 线上会场 Online connections:

腾讯会议 Tencent Meeting (VooV Meeting):

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Password: 2308

**Parallel session 6-Hydraulic turbines 水轮机-14th****Monday, August 14, 2023 (2023年8月14日星期一)****Laining hotel (徠宁酒店)****Shen Zhen Hall (深圳厅) - 6<sup>th</sup> floor**

| <b>10:00-12:00 Session: Hydraulic turbines 水轮机 Chair: Mohamed Farhat (EPFL)</b> |                |  |  |
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| <b>Paper ID</b>   | <b>Time/时间</b> | <b>Paper Title / 题目</b>  | <b>Paper Authors / 作者</b>  |
| 4   | 10:00-10:15    | Numerical Investigation of Wake Properties of a Propeller Using Immersed Boundary Method                                     | Haoyu Li, Kan Kan  |
| 9   | 10:15-10:30    | Research on incipient and critical cavitation of a Francis turbine   | Jing Yang, Liang Yao, Jie Liu, Zhe Ma, Yong Sun, Zhengwei Wang                     |
| 10  | 10:30-10:45    | Numerical Investigation of Performance and Flow Characteristics of Francis Turbine in Part Load Condition                    | Baig Mirza Umar, Xingxing Huang, Zhengwei Wang                                     |
| 19  | 10:45-11:00    | Vortices Evolution Characteristics and Pressure Pulsations of Variable-speed Francis Turbine                                 | Changbing Zhang, Chongxun Wang, Yongqi Zhang, Wenquan Wang, Demin Liu, Chunhe Shen |
| 20  | 11:00-11:15    | Stability analysis of hydropower unit operation conditions considering hydro-turbine nonlinearity                            | Xueding Lu, Chaoshun Li  |
| 124   | 11:15-11:30    | Research on the Reliability Benchmarking Method of Generating Units  | Yan Chang, Jianfeng Li, Juan Yang, Ruiyuan Zhang, Beibei Xu, Zhaoqian Wang         |
| 39  | 11:30-11:45    | The Design and the Retrofit Implementation of the Inlet spherical Valve in Tian Huang-ping Pumped Storage power station      | Xiongfeng Hu, Xiang Zhang, Yingxia Zheng, Chengjun Li, Xin Zhang                   |
| <b>12:00-12:15 Coffee Break</b>   |                |  |  |
| <b>12:15-14:00 Session: Hydraulic turbines 水轮机 Chair: Mohamed Farhat (EPFL)</b> |                |  |  |
| 82  | 12:15-12:30    | Study of intensity index for extraordinary stress on blade during start-up of Francis turbine                                | T Mukai, M Nakazono, K Tezuka, T Hasunuma, J Matsui                                |
| 90  | 12:30-12:45    | Investigation of hydraulic characteristics of Pelton turbine with casing structure using a moving particle simulation method | S Gong, H T Zhou, Z N Wang   |

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| 306   | 12:45-13:00 | A Brief Analysis on Selection of Inlet Valve Types for a Hydropower Station   | Yin Jing  |
| 41  | 13:00-13:15 | A brief discussion on the differences between Chinese and western design engineers in the rated head selection design of hydropower station         | Gao Min, Liu Guofeng, Wang Long, Wang Juan, Yu Chong                                |
| 195   | 13:15-13:30 | Analysis of Internal Flow and Vibration Characteristics of Tubular Turbine Considering Dynamic Change of Liquid Level in Reservoir Area <b>(OL)</b> | Yaping Zhao, Yajing Ren, Yanrong Li, Jianjun Feng, Xingqi Luo                       |
| 28  | 13:30-13:45 | Numerical simulation of fish damage in a bulb tubular turbine with different guide vane openings <b>(OL)</b>  | Li Qian, Yu Yang, Yang Chunxia, Zhang Qianxu, Zheng Yuan                            |
| 391   | 13:45-14:00 | Study on Reliable Operation of Hydropower System and Turbine-Generator Units  | Xu Yiqun, Zou Rui1, Wang Chao, Liu Diancheng, Su Guangfu, Zhan Lejun and He Xueyuan |
| <b>14:00-16:00 Lunch</b>  |             |   |   |
| <b>16:00-18:00 Session: Hydraulic turbines 水轮机 Chair: Wenquan Wang (Sichuan University)</b> |             |   |   |
| 151   | 16:00-16:15 | Operation Mode of Hydroelectric Units for Clean Energy Consumption - Case study of Liji Xia Hydropower Station                                      | Zhen Zhang, Junzhi Zhang, Beibei Xu, Xinyu Ma                                       |
| 157   | 16:15-16:30 | Numerical simulation study of hydraulic performance of the ball valve implied in ultra-high head Pelton turbine                                     | J Liu, J J Wang, S Gong, Z N Wang   |
| 172   | 16:30-16:45 | Hydraulic Optimization of An Eco-friendly Bulb-Turbine  | T J Zhan, J Liu, X Zhang, Z W Guan, Z N Wang  |
| 174   | 16:45-17:00 | Investigation into the Vortex Evolution characteristics of the Francis Turbine During the Runaway Process   | Li Yanyan, Guo Pengcheng, Sun Longgang, Zheng Xiaobo                                |
| 177   | 17:00-17:15 | Study on partial load vortex and pressure pulsation characteristics of Francis turbine  | Zheng XB, Sun SH, Wang ZR, Ren P, Qin ZL, Yu Y, Zhou H                              |
| 228   | 17:15-17:30 | A Comparative Analysis on the Efficient and Stability Cam Curve of a 200 MW Kaplan Turbine Unit   | W Zhao, M Xia, Z Wang   |
| 309   | 17:30-17:45 | Strength Evaluation of the Flow Passage Stationary Structures of a Large Francis Turbine Unit   | L Jiang, J Xiao, W Zhao, X Huang, J Cao, Z Wang                                     |

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| 18:00-18:15 <b>Coffee Break</b>   |             |   |   |
| 18:15-20:00 <b>Session: Hydraulic turbines</b> 水轮机 Chair: Wenquan Wang (Sichuan University) |             |   |   |
| 224   | 18:15-18:30 | Analysis of ultra-low frequency Oscillation mechanism of hydraulic turbine governor under different control modes | G Li, C Feng, Y Zheng   |
| 232   | 18:30-18:45 | Design of Pelton Turbine Test Stand in Plateau Environment  | Jinhan Cai, Xuejun Zhou, Hongying Luo, Zhengwei Wang  |
| 242   | 18:45-19:00 | Study on the design of short blade offset for the long and short blade runner of 1000 MW hydraulic turbine units  | Yonggang Lu, Zequan Zhang, Hao Chen, Kui Liu, Xingxing Huang, Honghui Li, Zhengwei Wang, Alexandre Presas |
| 246   | 19:00-19:15 | Study of hydraulic turbine rheological noise distribution law based on defective runner blade                     | Hongjiang Pan, Fengrong Yu, Yun Zeng, Yuchen Liu, Jianping Guo  |
| 256   | 19:15-19:30 | Investigation on Large Fluctuation Transient Process of High Head Pelton Turbine                                  | J Gao, L Han, H J Wang, Y X Liu, X Z Wei, D Q Qin   |
| 260   | 19:30-19:45 | Evaluation of Forces on the Needle for Regulation of Pelton Turbine Injector <b>(OL)</b>                          | F Khan, A Kumar, T Staubli  |
| 20:00-22:00 <b>Dinner</b>   |             |   |   |

**线上会场 Online connections:**

腾讯会议 Tencent Meeting (VooV Meeting):

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**Parallel session 7-Sediment erosion 泥沙磨损磨蚀 - Ocean energy 海洋能 - Multi-field coupling 多场耦合 -Small and micro hydropower 小微水电-Selected topics 自选主题-14th**

**Monday, August 14, 2023 (2023年8月14日星期一)**

**Laining hotel (徕宁酒店)**

**Shan Dong Hall (山东厅) - 6<sup>th</sup> floor**

| 10:00-12:00 <b>Session: Sediment erosion 泥沙磨损磨蚀</b> Chair: Xijie Song (Yangzhou University)                                |             |  |   |
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| Paper ID   | Time/时间     | Paper Title / 题目   | Paper Authors / 作者  |
| <b>Invited Lecture</b>   | 10:00-10:30 | <b>Research and application of key technologies for the large-scale high-efficiency corrosion-resistant and wear-resistant pumps</b> | <b>Wen Yang</b> (Sanlian Pump Industry Co., Ltd, China)   |
| 248  | 10:30-10:45 | Experimental Study of the Effects on Performance of Francis Turbine due to Sediments in Flow   | Ravi Poudel, Junde Shi, Zilong Zhao, Zhongdong Qian, Zhiwei Guo, Sailesh Chitrakar, Bhola Thapa                 |
| 183  | 10:45-11:00 | Influence of sediment concentration on erosion characteristics of hydraulic machinery materials                                      | Song Guohua, Yang Junfeng, Sun Shuaihui, Li Shaoyi, Li Meng, Wang Kai, Wu Pengbo, Zhao Yifan, Guo Pengcheng     |
| 332  | 11:00-11:15 | Numerical analysis of the sand abrasion of a Pelton turbine injector   | Liang Quanwei, Liu Jie, Xiao Yexiang, Zhu Yilin, Li Haijun, Zhou Hengte, Yang Nianhao, Deng Haifeng, Du Qingpin |
| 138  | 11:15-11:30 | Numerical simulation of sand erosion in Venturi tube under different flow characteristics and sand content                           | Jiale Pan, Weilong Guang, Qiang Liu, Jiahao Lu, Ran Tao, Di Zhu, Ruofu Xiao                                     |
| 259  | 11:30-11:45 | PIV experimental study on water-sediment two-phase flow in NACA0012 cascade  | Lei Zhu, Zhen Liu, Jianguang Zhang, Haiping Zhang, Li Lu  |
| 12:00-12:15 <b>Coffee Break</b>  |             |  |   |
| 12:15-14:00 <b>Session: Ocean energy 海洋能 &amp; Small and micro hydropower 小微水电</b> Chair: Xijie Song (Yangzhou University) |             |  |   |
| 118  | 12:15-12:30 | Numerical investigation of the hydrodynamic properties of oscillating water column air chambers (OL)                                 | JiaWei Ding, Zhenmu Chen, Baoshan Zhu, Dongji Xuan, Yunde Shen, Yong Li, Mingge Wu                              |

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| 209  | 12:30-12:45 | Research on sediment flow characteristics of bucket in a Pelton turbine   | Jiaxing Lu, Lihao Li, Yong Gong, Linyong Qian, Xiaobing Liu  |
| 53   | 12:45-13:00 | The dynamical response of turbulent flow to bed deformation under submerged discharge and plane vertical impinging jets               | Liao Tingting, Xu Huating  |
| 240  | 13:00-13:15 | Analysis of OWC impulse turbine flow characteristics considering the tip clearance  | Liu Jiajie, Liu Jie, Xiao Yexiang, Du Qingpin, Lin Hao, Zhu Yilin                                      |
| 378  | 13:15-13:30 | Investigation on hydraulic characteristics of a model and prototype bulb turbine based on similarity criteria                         | Xuezhi Zhou, Yongyao Luo, Zhengwei Wang, Soohwang Ahn, Hongyun Luo, Yibin Wu, Jingming Zhou            |
| 88   | 13:30-13:45 | Technical Characteristics and Application Introduction of Horizontal Shaft Francis Double Runner Hydro Turbine Unit                   | Ding Kuang, Chen Zujia   |
| <b>14:00-16:00 Lunch</b>   |             |   |  |
| <b>16:00-18:00 Session: Multi-field coupling 多场耦合 &amp; Selected topics 自选主题</b> Chair: Beibei Xu (Northwest A&F University) |             |   |  |
| 42   | 16:00-16:15 | Analysis of factors affecting erosion and wear of high chromium cast iron for dredge pump and its performance improvement <b>(OL)</b> | Wang W K, Guo T, Ma Y  |
| 74   | 16:15-16:30 | Intelligent Positioning System Design for Bridge Crane in Hydropower Plant <b>(OL)</b>  | Tiehua Chen, Ming Xu, Yanze Zou, Guangxin Wu, Xinyu Zhao and Yu Pan                                    |
| 126  | 16:30-16:45 | Research on the Digital Maintenance Construction of Hydropower Unit <b>(OL)</b>   | Tiehua Chen, Yu Pan, Xinze Liu Guangxin Wu, Ming Xu  |
| 24   | 16:45-17:00 | Numerical prediction of erosion of Francis turbine in sediment laden flow   | Jinliang Wang, Xijie Song, Li Wang, Mingliang Zhao, Zhengwei Wang                                      |
| 188  | 17:00-17:15 | Exploration and Application of Welding Technology for Misalignment of Pressure Pipe Orifices in a Pumped Storage Power Station        | Haitang Mi, Peilei Feng, Xiaoya Chen, Anping Zhu, Jianqiang Guo, Xiangxiang Liu, Shaohua Wang, Xi Wang |
| 136  | 17:15-17:30 | POD Mode Analysis of the Wake Flow of Savonius Hydrokinetic Turbine Runner  | Weilong Guang, Jiale Pan, Qiang Liu, Jiahao Lu, Ran Tao, Di Zhu, Ruofu Xiao                            |
| 139  | 17:30-17:45 | Research and Application of an Intelligent System for Dredging Engineering Geological Database Based on Exploration Data              | Zheng Lu, Hui Sun, He Bai, Xiaowei Yan, Yuchi Hao  |
| <b>18:00-18:15 Coffee Break</b>  |             |   |  |

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| 18:15-20:00 <b>Session: Multi-field coupling</b> 多场耦合 & <b>Selected topics</b> 自选主题 Chair: Beibei Xu (Northwest A&F University) |             |   |   |
| 45  | 18:15-18:30 | Multi-channel deterioration trend prediction of pumping storage unit based on temporal graph convolution network          | Xiangqu Xiao, Chaoshun Li   |
| 143   | 18:30-18:45 | Fault diagnosis method of rolling bearing based on MSSA-VMD algorithm   | Tian Yu, Chaoshun Li  |
| 197   | 18:45-19:00 | Assembly welding key points of a large Francis turbine runner   | Hengqian Zhang, Wenshuang Wang, Jinsheng Chen, Peng Liu, Gaomeng Zhang, Zhipeng Tian, Yonghong Lu |
| 347   | 19:00-19:15 | Numerical investigation on fluid-solid interaction of large-scale centrifugal pumps for pump station                      | Shuai Liu, Yuhan Gao, Yongming Zhi, Lei Tan   |
| 146   | 19:15-19:30 | Research on modulation characteristics of multi-physical fields in typical rotating machine with eccentric air-gap faults | Zhengyang Liu, Tonghe Zhang, Yongxing Song, Bin Huang, DazhuanWu                                  |
| 20:00-22:00 <b>Dinner</b>   |             |   |   |

**线上会场 Online connections:**

腾讯会议 Tencent Meeting (VooV Meeting):  
ID: 381-643-144

**Parallel session 8-Hydraulic turbines 水轮机-14th****Monday, August 14, 2023 (2023年8月14日星期一)****Laining hotel (徠宁酒店)****Guang Dong Hall (广东厅) - 6<sup>th</sup> floor**

| 10:00-12:00 Session: Hydraulic turbines 水轮机 Chair: Daqing Zhou (Hohai University) |             |   |  |
|---|-------------|---|--|
| Paper ID  | Time/时间     | Paper Title / 题目  | Paper Authors / 作者   |
| 329   | 10:00-10:15 | Experimental analysis of the pressure fluctuations for a prototype pump-turbine at different operating conditions | Bao Guo, Ran Yu, Ye Ye, Xiushu Li, Yexiang Xiao                                  |
| 265   | 10:15-10:30 | Investigation on formation mechanism of cavitation channel vortex in the runner of Francis turbine                | Guangkuan Wu, Qiyao Xue, Ziwu Guan, Zhu Guojun, Jianjun Feng                     |
| 277   | 10:30-10:45 | Influence of Guide Vane Opening on Internal Cavitation of Francis Turbine   | Minjia Chen, Xingqi Luo, Jianjun Feng, Siqin Lv                                  |
| 285   | 10:45-11:00 | Effect of uneven inflow on hydrodynamic performance of bulb turbine   | H Liu, Y G Cheng, Z Y Yang, J Zhang, J Y Fan , W X Li                            |
| 289   | 11:00-11:15 | Study on hydraulic turbine modeling method based on IGSA-NN revision strategy                                     | Jinbao Chen, Yunhe Wang, Wenqing Hu, Yidong Zou, Yang Zheng, Zhihui Xiao         |
| 308   | 11:15-11:30 | Evaluation on structural characteristics of the spiral case influenced by external concrete                       | Zhaohui Lu, Yutong Luo, Qiao Guo, Shaozheng Zhang, Xingxing Huang, Zhengwei Wang |
| 48  | 11:30-11:45 | Analysis of the impact of Tibet Plateau environment on the operating conditions of water turbine machine          | Hongying Luo, Jiuming Xie, Quanwei Liang, Zhengwei Wang                          |
| 12:00-12:15 Coffee Break  |             |   |  |
| 12:15-14:00 Session: Hydraulic turbines 水轮机 Chair: Daqing Zhou (Hohai University) |             |   |  |
| 311   | 12:15-12:30 | Research on the spiral case and external concrete structural response under limit operation state                 | Yutong Luo, Zonghua Li, Xingxing Huang, Xiaopeng Zhang, Zhengwei Wang            |
| 317   | 12:30-12:45 | Hydraulic analysis of jet deflection on Pelton turbine deflector based on   | Yuan Simin, Zhou Hengte, Wang  |

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|  |             | CFD simulation  | Zhaoning, He Qiyuan, Liang Quanwei   |
| 319  | 12:45-13:00 | Numerical study on the influence of the bucket offset angle on the flow field of Pelton turbines with six-nozzles               | Xiao-Dong Wang, Wen-Quan Wang, Jia-Fu Yang, Chang-Bing Zhang, Wen-Zhe Cao                          |
| 264  | 13:00-13:15 | Study on the relationship between draft tube pressure pulsation and unit vibration based on mutual information method           | Yiting Xu, Yun Zeng, Liping Pan, Huan Zhang, Yanfei Sun, Jing Qian                                 |
| 330  | 13:15-13:30 | Dynamic stress analysis of a large capacity Pelton turbine runner   | Liu Zishi, Xiao Yexiang, Min Hongping, Liang Quanwei, Wang Xiaodong, He Qiyuan, Liu Jie, Li Haijun |
| 331  | 13:30-13:45 | Effect of the operating head for hydraulic performance and flow of a Pelton turbine   | Li Yanhao, Liu Zishi, Xiao Yexiang, Liang Quanwei, Liu Jie, Wang Zhaoning                          |
| <b>14:00-16:00 Lunch</b>   |             |   |  |
| <b>16:00-18:00 Session: Hydraulic turbines 水轮机 Chair: Long Meng (China Institute of Water Resources and Hydropower Research)</b> |             |   |  |
| 341  | 16:00-16:15 | Analysis of the bucket surface cavitation characteristics of a model Pelton turbine   | Liu Jie, Xiao Yexiang, Liu Zishi, Liang Quanwei, Zhou Hengte, Hu Zongqiu, Du Qingpin               |
| 342  | 16:15-16:30 | Numerical method analysis of multi-nozzle distributor performance for large Pelton turbine                                      | Zhu Yilin, Liu Jie, Xiao Yexiang, Liang Quanwei, Li Haijun, Du Qingpin, Wang Zhaoning              |
| 344  | 16:30-16:45 | Inversion calculation and Analysis of transient process for pumped storage power station  | MA Yanmei, ZHANG Hong, FAN Jiayi, ZHANG Jian   |
| 346  | 16:45-17:00 | Research on the Analysis Method of Measured Pressure Data during the Transient Process of Load Rejection in Hydropower Stations | FAN Jiayi, MA Yanmei, ZHANG Jian, DU Xuan , LIN Fangzhou   |
| 352  | 17:00-17:15 | Study on On-Line Monitoring Technique and Case Study of Pump-Storage Turbine Headcover Bolt Axial Load                          | Meng Zhang, Qifei Wang, Yushu Xia , Lei Tang   |
| 357  | 17:15-17:30 | Optimization Study on Lateral Stability of Large Tubular Hydroelectric Generating Units   | X T Chen, Y M Fan, X Du, M K Wang, Q W Zhou, J Chen, K Liu   |

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| 356  | 17:30-17:45 | Research on Unbalanced Lifting of Large Hydro Generator Units   | M K WANG, J A DENG , Q Y HE                                  |
| 18:00-18:15 <b>Coffee Break</b>  |             |   |  |
| 18:15-20:00 <b>Session: Hydraulic turbines</b> 水轮机 Chair: Long Meng (China Institute of Water Resources and Hydropower Research) |             |   |  |
| 358  | 18:15-18:30 | Study on the influence of crescent-rib shape on overall strength and stiffness of distributor                   | L X KONG, J P ZHOU , Q Y HE                                  |
| 362  | 18:30-18:45 | Study on sensitivity evaluation of conveyance system to hydraulic transient in pumped storage plant             | ZHOU Shun, FAN Jiayi, ZHANG Jian, MA Yanmei , CHEN Taiping   |
| 364  | 18:45-19:00 | Research on Structure Strength Design of Distributor of Pelton turbine in Hydropower Stations                   | J P ZHOU, L X KONG, Q Y HE                                   |
| 369  | 19:00-19:15 | Discussion on precise control of bulb tubular turbine   | Wei Wang, Jiankang Deng , Xiaoman Cheng                      |
| 376  | 19:15-19:30 | Calculation method for natural frequency and damping ratio of hydropower units based on motion model separation | Shige Yu, Yun Zeng, Fang Dao, Xiang Li, Yiting Xu, Jing Qian |
| 20:00-22:00 <b>Dinner</b>  |             |   |  |

**Parallel session 9-Hydraulic turbines 水轮机 - Pumps 泵 - Vortex breakdown 旋涡溃灭-14th**  
**Monday, August. 14, 2023 (2023年8月14日星期一)**  
**Laining hotel (徠宁酒店)**  
**Fu Jian Hall (福建厅) - 6<sup>th</sup> floor**

| 10:00-12:00 Session: Hydraulic turbines 水轮机 Chair: Wei Yan (Andritz (China) Co., Ltd.) |             |  |  |
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| Paper ID   | Time/时间     | Paper Title / 题目   | Paper Authors / 作者   |
| 52   | 10:00-10:15 | IEC 62882 Francis turbine pressure fluctuation transposition from model to prototype(OL)         | Qin Daqing, Xu Yongliang, Wu Xidong, Meng Xiaochao   |
| 64   | 10:15-10:30 | Optimization Design and Test Verification of Guide Vanes for a Fish-Friendly Francis Turbine     | Y L Yi, W P Wang, T Y Li, Z X Gao, L Lu , L He   |
| 76   | 10:30-10:45 | Analysis of the factors influencing the guide vane hydraulic torque of Francis turbine           | X Y Ji, M X Xie and X La   |
| 80   | 10:45-11:00 | Experimental study on draft tube of a model Kaplan turbine                                       | Lianchen Xu, Kan Kan, Yuan Zheng and Demin Liu   |
| 92   | 11:00-11:15 | Hydraulic simulation analysis of runners with different bucket numbers                           | Zhou Hengte, Gong sheng, Wang Zhaoning, Liang Quanwei  |
| 98   | 11:15-11:30 | Vortex Characteristics in the Draft Tube of a Francis Turbine under Different Working Conditions | Yuanhang Hou, Linmin Shang, Ming Xiao, Shenhui Li, Zhen Li, Haibin Zhang, Yinhui Cai, Yongzhong Zeng, Lei Zou, Jiayang Pang , Xiaobing Liu |
| 56   | 11:30-11:45 | Study on erosion characteristics of turbine in sediment-laden river                              | Xin-Yu Wei, Jun-Xian Pei, Guo Xie, Wen-Quan Wang   |
| <b>12:00-12:15 Coffee Break</b>  |             |  |  |
| 12:15-14:00 Session: Hydraulic turbines 水轮机 Chair: Wei Yan (Andritz (China) Co., Ltd.) |             |  |  |
| 290  | 12:15-12:30 | Analysis Factors on the Hydraulic Torque of Guide Vane of Francis Turbine                        | X Y Ji, M X Xie , X Lai  |
| 207  | 12:30-12:45 | Data-model interactive health condition assessment for hydropower unit                           | Yujie Liu, Jie Liu, Fengyuan Zhang, Hua Gao, Yuxin Li , Xiaohui Yuan   |

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| 263  | 12:45-13:00 | Investigation on hydraulic loss characteristic of Kaplan turbines based on entropy generation theory  | Boxing Liu, Jianjun Feng, Zhaoning Wang, Ziwu Guan, Guojun Zhu  |
| 388  | 13:00-13:15 | A review of the experimental techniques research progress of the Pelton turbine   | Gui Zhonghua, Xiao Yexiang, Li Dongkuo, Xiao Wei, Lin Hao, Liu Zishi, Zhu Yilin   |
| 338  | 13:15-13:30 | Understanding the modal response of a full-scale 200 MW Francis turbine runner  | R Roig , X Sánchez-Botello, E Wiborg, X Escaler   |
| 355  | 13:30-13:45 | Analysis of oil film flow characteristics and lubrication performance of thrust bearing of 1000MW Hydraulic Turbine Unit                            | Yishu Shi, Siyuan Wu, Xingxing Huang, Xingmin Liu, Zhengwei Wang  |
| 365  | 13:45-14:00 | Influence of tungsten carbide spray treatment on anti-wear performance of Francis turbine runner blades surface                                     | Bing Yao, Yuanyuan Gang, Shenhui Li, Ming Xiao, Zhishun Yu, Dengyun Jiang, Bei Qin, Yijin Zhou, Mengjun Qin, Jiayang Pang, Xiaobing Liu |
| <b>14:00-16:00 Lunch</b>   |             |   |   |
| <b>16:00-18:00 Session: Pumps 泵</b> Chair: Ji Pei (Jiangsu University)                             |             |   |   |
| 26   | 16:00-16:15 | Study on the Combined Transition Process of Water Pump and Turbine  | Yang Fuchao, Zhang Zhengyang  |
| 35   | 16:15-16:30 | Numerical analysis of the transient characteristics of internal flow in the acceleration process of variable speed regulation of a centrifugal pump | Haichen Zhang, Jian Sun, Wei Dong, Yan Dong, Peixuan Li   |
| 86   | 16:30-16:45 | Analysis of pressure pulsation in a multi-stage double suction centrifugal pump   | Wenjie Peng, Ji Pei, Shouqi Yuan, Wenjie Wang   |
| 115  | 16:45-17:00 | Performance prediction of IS centrifugal pump based on improved BP neural network   | D H Yu1, Y Chen, C Wang, Y C Yang1, L L Ma, W S Ma  |
| 150  | 17:00-17:15 | Erosion characteristics of a centrifugal pump based on rosin-rammler distribution of particles  | Haili ZHANG, Mendi CHEN, Guosheng XIA, Lei TAN  |
| 204  | 17:15-17:30 | Research on Pressure Surge and Hydraulic Load in Primary Loop under Axial-flow Reactor Coolant Pump Rotor Seizure Condition                         | CUI Haoyu, YANG Congxin, GUO Yanlei, CHEN Xiaoyan , LV Tianzh   |
| <b>18:00-18:15 Coffee Break</b>  |             |   |   |
| <b>18:15-20:00 Session: Pumps 泵 &amp; Vortex breakdown 旋涡溃灭</b> Chair: Ji Pei (Jiangsu University) |             |   |   |
| 89   | 18:15-18:30 | Influence of extenal characteristics of vane sweptback angle double   | R N Li,F X Li, Y P Tian   |



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|                           |             | suction pump in sandy water   |  |
| 97                        | 18:30-18:45 | Investigation on the Influence of Overflow Hole Diameter on Start-up process of Axial Flow Pump System                      | Xiaowen Zhang, Chong yang Hu, Fangping Tang              |
| 237                       | 18:45-19:00 | Data acquisition in a simplified turbine model for prediction of unsteady vortex phenomena                                  | S Skripkin, D Suslov, E Gorelikov, M Tsoy and I Litvinov |
| 208                       | 19:00-19:15 | Effectiveness of Air Admission through Short Pipes in Reducing Pressure Fluctuation of Propeller Hydro-turbine Flow Channel | Huanyu Wu, Yongyao Luo, Faye Jin, Chongji Zeng, Xin Liu  |
| 20:00-22:00 <b>Dinner</b> |             |   |  |

**线上会场 Online connections:**

腾讯会议 Tencent Meeting (VooV Meeting):  
ID:744-116-737

**Parallel session 10-Intake system 输水系统-Sustainable hydropower 可持续水电-Vibration and fatigue loading 振动与疲劳-Smart grid and digital twin 智慧电网与数字孪生-Selected topics 自选主题-14th**

**Monday, August. 14, 2023 (2023年8月14日星期一)**

**Laining hotel (徕宁酒店)**

**Hai Nan Hall (海南厅) - 6<sup>th</sup> floor**

| 10:00-12:00 Session: Selected topics 自选主题 & Intake system 输水系统 Chair: Joon Yong Yoon (Hanyang University) |             |  |  |
|---|-------------|--|--|
| Paper ID  | Time/时间     | Paper Title / 题目   | Paper Authors / 作者   |
| 185   | 10:00-10:15 | The setting criterion of the downstream surge chamber for pumped storage power station                                       | Jue Wang, Jinghuan Ding, Wenfu Han, Long Zhao, Kenan Du  |
| 382   | 10:15-10:30 | Research and Application of Deep Water Dredging Package Technology   | Will Yan, Puying Qiu, Yaqiong Zhang  |
| 227   | 10:30-10:45 | Analysis of Primary Frequency Modulation Performance Test for a Hydropower Station   | Peilei Feng, Xiaoya Chen, Anping Zhu, JianqiangGuo, XiangxiangLiu, Shaohua Wang, Shaozheng Huang, Jie Wu, Tianqi Xu, Zhijian Liu |
| 278   | 10:45-11:00 | Sensitivity analysis of influencing factors in large oscillation hydraulic transient process of pumped storage power station | LIU Tao, HU Tengyao, YUAN Yanliang, TANG Lei, WANG Hongqing  |
| 322   | 11:00-11:15 | A signal coverage scheme for pumped storage power station  | Xie Zhang, Tao Liu, Zhengxin Cao, Liang Liu, Zan Zhou  |
| 361   | 11:15-11:30 | Research on Fault Diagnosis of Main Equipment Based on Watershed Power Production Data Center                                | Zhuo Kang, Chen Xiaoyi, Zheng Wei, Song Linli, Zhang Peng, Shi Fatai, Wu Dongjun, Guo Yuting                                     |
| 58  | 11:30-11:45 | Integrated treatment technology for leakage of concrete panel dam in high-cold areas   | Jing Li, Hongzhi Gao   |
| 12:00-12:15 Coffee Break  |             |  |  |
| 12:15-14:00 Session: Selected topics 自选主题 & Intake system 输水系统 Chair: Joon Yong Yoon (Hanyang University) |             |  |  |

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| 79  | 12:15-12:30 | Flame detection method and application based on RGB-HSI model and initial flame growth characteristics <b>(OL)</b>                                     | Yuquan Zhou, Guanjie Liu, GuoDong Xie                                       |
| 47  | 12:30-12:45 | Consideration on setting conditions of the upstream surge chamber in the water transmission system of pumped storage power station                     | Long Zhao, Jue Wang, Yanan Cheng  |
| 18  | 12:45-13:00 | Pressure Pulsation Analysis of 2D NACA66 Airfoil Based on Pulsation Tracking Network   | Jiahao Lu, Qiang Liu, Jiale Pan, Weilong Guang, Ran Tao, Di Zhu, Ruofu Xiao |
| 274   | 13:00-13:15 | Stability analysis of a hydropower plant containing pipe and channel flows   | Yang Zheng, Qijuan Chen, Wanying Liu, Jinbao Chen, Zhihuai Xiao             |
| AA  | 13:15-13:30 | Experimental study on negative pressure and air compensation at the rear end of fixed cone valve and piston valve under submerged discharge conditions | Yong Xu (KARON VALVES)  |
| <b>14:00-16:00 Lunch</b>  |             |  |   |
| <b>16:00-18:00 Session: Smart grid and digital twin 智慧电网与数字孪生 &amp; Sustainable hydropower 可持续水电 &amp; Vibration and fatigue loading 振动与疲劳</b> Chair: Jiaying Lu (Xihua University) |             |  |   |
| 269   | 16:00-16:15 | A unit commitment method of pumped storage in renewable energy system via a twofold particle swarm optimization algorithm                              | L T Ji, X Y Jing, P Wang, T Zhang, W D Xiao, J Qin, R Wang, W J Yang        |
| 46  | 16:15-16:30 | Analysis of calculation conditions for transition process of pumped storage power station  | Taozhe Ren, Yanan Cheng, Jue Wang, Long Zhao                                |
| 266   | 16:30-16:45 | Analysis of Inspection and Testing Standards for Water Conservancy Projects in China   | Lin Li, Chunhua Sheng, Weijie Huo, Hong Xu                                  |
| 1   | 16:45-17:00 | Anti-seepage Measures for the Upper Reservoir of One Pumped-storage Power Station  | Yanan Cheng, Jue Wang, Long Zhao  |
| 21  | 17:00-17:15 | Study on the Influence of Geometric Parameters on Vibration Characteristics of Hydraulic Oscillator Used in Oil Drilling                               | Peng Tang, Haoru Zhao, Baoshan Zhu, Jiaying Lu, Wenwu Zhang                 |
| 112   | 17:15-17:30 | Finite element numerical analysis of structural vibration of a certain pump station  | Shaopeng Lu, Haiyun Qiu, Xu Lei, Jiang Wei, Honggang Fan                    |
| <b>18:00-18:15 Coffee Break</b>   |             |  |   |

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| 18:15-20:00 <b>Session: Smart grid and digital twin 智慧电网与数字孪生 &amp; Sustainable hydropower 可持续水电&amp; Vibration and fatigue loading 振动与疲劳</b> Chair: Jiaxing Lu (Xihua University) |             |   |   |
| 198  | 18:15-18:30 | Hydroelectric Generator Unit Fault Identification Method Based on Multi-scale Vibration-noise Feature <b>(OL)</b> | Hao Zhang, Liehao Hu  |
| 370  | 18:30-18:45 | Research of Key Technologies on Design and Implementation of Intelligent Pump Station                             | Xinxin Wang, Zhe Zhao, Ying Li, Chungeng Jiang, Ligang Li, Ye Zhou      |
| 373  | 18:45-19:00 | Research on contact stiffness of tenon jointed turbine bladed disk under time-varying load                        | Zhen Qu, Can Yao, Zhu Honglai, Xingrong Lin, Lei Chen and Heran Hu      |
| 301  | 19:00-19:15 | Research on load allocation of hydropower units based on random forest algorithm                                  | Jie Yang, Hong Pan, Yuan Zheng, Fang Feng, Chenyang Hang, Xiaonan Zheng |
| 213  | 19:15-19:30 | Stress measurement of runner blade for a Francis prototype turbine  | Dengfeng Cao, Martin Dodge, Ye Zhou, Juan Liu                           |
| 20:00-22:00 <b>Dinner</b>  |             |   |   |

**线上会场 Online connections:**

腾讯会议 Tencent Meeting (VooV Meeting):  
ID: 908-738-612

**Parallel session 11-Computational fluid dynamics and fluid structure interaction 计算流体力学与流固耦合-Energy storage and flexibility 储能与灵活性-Model tests and laboratory tests 模型试验与实验测量-Measurement techniques and signal processing 测量技术与信号处理-14th**

**Monday, August. 14, 2023 (2023年8月14日星期一)**

**Laining hotel (徠宁酒店)**

**Liao Ning Hall (辽宁厅) - 6<sup>th</sup> floor**

| 10:00-12:00 Session: Measurement techniques and signal processing 测量技术与信号处理 Chair: Morten Kjeldsen (Flow Design Bureau AS.) |             |   |  |
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| Paper ID  | Time/时间     | Paper Title / 题目  | Paper Authors / 作者   |
| 44  | 10:00-10:15 | Multivariate Iterative Nonlinear Chirp Mode Decomposition: Principles and Applications                                | Jie Huang, Chaoshun Li   |
| 148   | 10:15-10:30 | Research on fault diagnosis strategy of air-conditioning system based on DPCA and deep learning                       | Qizheng Ma, Zhiwen Wang, Yongxing Song, Yueping Yu, Linhua Zhang                               |
| 211   | 10:30-10:45 | Analyzing the optimization of the control system for pumped storage power plants' main inlet valves                   | Yalong Wang, Haoran Li, Peilei Feng, Tiancong Liu, Bingqian Li                                 |
| 337   | 10:45-11:00 | Assessment of Fiber Bragg Grating sensors for monitoring induced strains on the draft tube cone of hydraulic turbines | X Sánchez-Botello, R Roig, O de la Torre, J Madrigal, S Sales, B Mulu, C-M Högström, X Escaler |
| 13  | 11:00-11:15 | Condition Assessment of Power On-load Tap Changer Based on Structure Weighted Dynamic Time Warping                    | Ruilin Yang, Lijun Luo, Fan Mo, Yu Liu, Jiada Wei, Pei Zhang                                   |
| 349   | 11:15-11:30 | Intelligent Hydraulic Model Testing System for Pumped Storage Power Plant   | Hongyun Xun, Wenli Liu, Quanwei Liang, Jiangyi Hu  |
| 94  | 11:30-11:45 | Measuring Uncertainty of Hydraulic Generator Efficiency by Calorimetric Method  | Xinjie Guo, Chunqiang Pan, Hongtao Li, Xuhui Xu, Cuiwei Jiang                                  |
| 371   | 11:45-12:00 | Numerical simulation analysis and experimental verification of air flow measurement in large-diameter S-shaped pipe   | Lu Jia, Yongzhong Zeng, Xiaobing Liu, Zhishun Yu   |
| 375   | 12:00-12:15 | Optimal Design of Data Acquisition System for Fault Diagnosis of  | H Qiu, B Jin, W Zhao, Z Wang*  |

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|  |             | Hydraulic Machinery  |  |
| 12:15-12:30 Coffee Break   |             |  |  |
| 12:30-14:00 Session: <b>Model tests and laboratory tests</b> 模型试验与实验测量 Chair: Morten Kjeldsen (Flow Design Bureau AS.)                     |             |  |  |
| 129  | 12:30-12:45 | Effect of runner tip clearance on hydraulic performance of Kaplan turbine  | Biao Shui, Jue Liu, Tingjun Zhan   |
| 270  | 12:45-13:00 | Research of Model Characteristics based on Probability Statistics Method for Condition Evaluation of Hydropower Unit       | Ye Zhou, Dengfeng Cao  |
| 313  | 13:00-13:15 | Research on Automatic Testing of Pump Turbine Model Test Based on Intelligent Technology                                   | Wenfu Han, Zhonghua Gui, Jinbing Ni, Zhe Man, Jinghua Ding, Dongkuo Li, Gang Wang                  |
| 335  | 13:15-13:30 | Study of the Measurement Method on the Dynamic Stress and Pressure of Model Pump-turbine Splitter Blades                   | Yingnan Zhao, Xiaolong Yang, Huanmao Wang, Kai Lin, Jinwei Zhang, Xingchun Lei, Yue Zhao, Wei Zhao |
| 321  | 13:30-13:45 | Study on Cavitation Determination of Pump Turbine Model Test   | Wenfu Han, Fei Zhang, Yifeng Zhao, Zhe Man, Jinghua Ding, Dongkuo Li, Gang Wang                    |
| A-131  | 13:45-14:00 | The effects of vortex generators on hydrodynamic performance of blade tip hydrofoil  | Pengzhong Wang   |
| 14:00-16:00 <b>Lunch</b>   |             |  |  |
| 16:00-18:00 Session: <b>Computational fluid dynamics and fluid structure interaction</b> 计算流体力学与流固耦合 Chair: Li Cheng (Yangzhou University) |             |  |  |
| 324  | 16:00-16:15 | Analysis of the velocity non-uniformity in water jet inlet duct <b>(OL)</b>  | Shen ZH.H., Li W, Pan ZH.Y.  |
| 217  | 16:15-16:30 | Effect of structural parameters of biomimetic jellyfish on propulsive performance <b>(OL)</b>                              | Xingyu Miao, Jinzhe Liu, Kailin Li, Ruihan Zhang, Li Gao   |
| 67   | 16:30-16:45 | Investigation on the effect of different groove depth and width on the tip clearance leakage flow of hydrofoil <b>(OL)</b> | Dong Liu, Chenhao Li   |
| 109  | 16:45-17:00 | Effect of Runner Radial Installation Deviation on the Flow Characteristics of the 1000MW Turbine                           | Yifan Wang, Xingxing Huang, Lingjiu Zhou, Zhengwei Wang  |
| 135  | 17:00-17:15 | FSI simulation of a high-head pump-turbine during load rejection process   | M J Tang, Y G Cheng, D M Liu, H Y  |

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|   |             |  | Chen, K Liu  |
| 167   | 17:15-17:30 | Vibration of Variable Speed Pump-Turbine in Turbine Operating Range: Simulation by CFD+FEM                                   | Song Xue, Yongguang Cheng, Demin Liu, Hongyu Chen, Yunfa Lin                         |
| 125   | 17:30-17:45 | Research on Closing Law of Guide Vane in a Francis turbine during the Load Rejection Process                                 | Xiu Wang, Yan Yan, Wen-Quan Wang   |
| 258   | 17:45-18:00 | Study on noise characteristics of centrifugal fan based on blade loading distribution  | Wenhao Cui, Jianjun Feng, Guojun Zhu, Zhenguo Ge, Wei Wang, Chenhao Li               |
| 199   | 18:00-18:15 | Study on the Performance and Wake Effects of a Vertical Axis Wind Turbine with Bionic Blades                                 | H Chang, D Y Li, H J Wang, Y R He, Z G Zuo, S H Liu                                  |
| 18:15-18:30 <b>Coffee Break</b>   |             |  |  |
| 18:30-20:00 <b>Session: Energy storage and flexibility</b> 储能与灵活性 Chair: Li Cheng (Yangzhou University) |             |  |  |
| 15  | 18:30-18:45 | Research on hydraulic variable pressure pumped compressed air energy storage system  | Biao Yang, Deyou Li, Xiaolong Fu, Haibo Liu, Hongjie Wang                            |
| 144   | 18:45-19:00 | On the Water Jet Quality at Part-Load Operation of Pelton turbines   | Bernhard Semlitsch   |
| 273   | 19:00-19:15 | Hydraulic transient calculation by wave tracking method for pumped storage power plant with four units in a diversion system | Xinyue Yin, Zongyao Zeng, Yuchuan Wang, Hongyu Chen, Dong Ma                         |
| 276   | 19:15-19:30 | Quantitative analysis on influence factors of power response rapidity of pumped storage units                                | Jingdan Chen, Weijia Yang, Yulan Li, Yiwen Liao, Yifan Huang, Yiming Qian, Qiao Chen |
| 294   | 19:30-19:45 | Selection of rated head of a pumped storage power station  | Long Zhao, Yanan Cheng, Jue Wang   |
| 20:00-22:00 <b>Dinner</b>   |             |  |  |

### 线上会场 Online connections:

腾讯会议 Tencent Meeting (VooV Meeting):  
ID: 392-935-311

**Parallel session 12-Cavitation and Multiphase flow 空化与多相流 -14th**

**Monday, August 14, 2023 (2023年8月14日星期一)**

**Laining hotel (徠宁酒店)**

**Zhe Jiang Hall (浙江厅) - 6<sup>th</sup> floor**

| 10:00-12:00 Session: <b>Cavitation and Multiphase flow</b> 空化与多相流 Chair: Xavier Escaler (Universitat Politècnica de Catalunya) |             |  |  |
|--|-------------|--|--|
| Paper ID   | Time/时间     | Paper Title / 题目   | Paper Authors / 作者   |
| 55   | 10:00-10:15 | Influence of different turbulence models on tip vortex prediction  | Mingkun Fang, Na Li, Ran Tao, Ruofu Xiao   |
| 169  | 10:15-10:30 | Physical investigation on hydrodynamic performance and structural characteristics of composite propeller   | L Dong, Q Wu, B Huang, G Wang  |
| 325  | 10:30-10:45 | A technique for identifying the cavitation shedding mechanism in a Venturi based on high-speed photography | Weibin You, Linmin Li, Xiaoxu Xuan, Songying Chen, Joon Yong Yoon, Xun Sun           |
| 280  | 10:45-11:00 | Analysis of liquid distribution in a propellant tank with vertical vanes by drop tower test                | J T Liu, J Long, L Chen, C Yao, W X Ye, Z Qu   |
| 389  | 11:00-11:15 | Cavitating flow around a low aspect ratio NACA0012 hydrofoil with regular grooves                          | M Tsoy, S Skripkin, A Kravtsova  |
| A-140  | 11:15-11:30 | Dynamics of transient cavitation at valve closures   | Guohong Wu, Huan Han, Shuhong Liu, Zhigang Zuo, Xuelin Tang                          |
| 162  | 11:30-11:45 | Degradation of tetracycline by combining hydrodynamic cavitation (HC) and permonosulfuric acid (PMS)       | Xiufeng Zhu, Xiaoxu Xuan, Sivakumar Manickam, Joon Yong Yoon, Xun Sun                |
| 219  | 11:45-12:00 | Degradation of tetracycline by combining hydrodynamic cavitation (HC) and UV                               | Shuai Liu, Xiaoxu Xuan, Sivakumar Manickam, Joon Yong Yoon, Xun Sun, Dennis YC Leung |
| 12:00-12:15 Coffee Break   |             |  |  |
| 12:15-14:00 Session: <b>Cavitation and Multiphase flow</b> 空化与多相流 Chair: Xavier Escaler (Universitat Politècnica de Catalunya) |             |  |  |
| 33   | 12:15-12:30 | Effect of the number of orifice plate stages on cavitation characteristics                                 | LI Da we, Wang Chengjun, Ju  |



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|  |             |  | Pengbo, Han Guihua   |
| 339  | 12:30-12:45 | Effects of cavitation on the vortex shedding behind a truncated hydrofoil subjected to forced oscillation  | Jian Chen, Xavier Escaler  |
| 153  | 12:45-13:00 | Experimental investigation into lock-in characteristics of the composite hydrofoils  | Miaomiao Ji, Housheng Zhang, Qin Wu, Biao Huang, Guoyu Wang  |
| 176  | 13:00-13:15 | Mechanism study of cloud cavitation control by leading-edge tubercles on NACA0015  | G S Zhao, N Liang, L L Cao, D Z Wu   |
| 220  | 13:15-13:30 | Modal decomposition of the shedding mechanism of partial cavitation in a Venturi Tube  | Gaoju Xia , Weibin You, Xiaoxu Xuan , Songying Chen , Joon Yong Yoon ,Xun Sun  |
| 134  | 13:30-13:45 | Numerical investigation of cavitation noise in cavitating flows around the NACA66 hydrofoil  | Chen Yang, Kai Ren, Zhenwei Huang  |
| 49   | 13:45-14:00 | Experimental Study on the Movement Law of Solid-liquid Two-phase Flow in slurry Pump(OL)   | Jin Xing, Shufeng Cheng, Tao Guo   |
| <b>14:00-16:00 Lunch</b>   |             |  |  |
| <b>16:00-18:00 Session: Cavitation and Multiphase flow</b> 空化与多相流 Chair: Shuaihui Sun (Xi'An University of Technology) |             |  |  |
| 377  | 16:00-16:15 | Numerical simulation and experimental study on sediment wear of movable guide vanes of high-head Francis turbines in muddy river based on discrete phase model | Yongzhong Zeng, Xiaobing Liu, Lu Jia, Zhenming Lai, Bo Zhou, Xueren Wang, Yanhua Yao, Bing Yao, Zhishun Yu, Haiqi Wang |
| 374  | 16:15-16:30 | Numerical simulation of gas-liquid interface in a vane type propellant tank  | L Chen, Y Li, J T Liu, X M He, W Li, N J Yang  |
| 155  | 16:30-16:45 | Numerical simulation on unsteady cavitating flows in a rotational hydrodynamic cavitation reactor  | G Q Q G MENG, W J ZHOU, Y F JIA  |
| 316  | 16:45-17:00 | On the validation of the cavitation model considering the thermodynamic effect of cavitating flow  | Lu Yu, Da Geng, Xin Liu, Shuhong Liu, Zhigang Zuo, Chongji Zeng, Hui Li  |
| 252  | 17:00-17:15 | Optimization of rotor blind hole parameters for inner-hole rotary cavitator  | Dawei Li, Yingjie Yang, Ning Ge, Guihua Han, Yipeng Zhu  |

|  |             |  |   |
|--|-------------|--|---|
| 57   | 17:15-17:30 | Research on Online Monitoring Technology of Cavitation in Hydraulic Machinery  | Zhao Yue, Li Renfei, Guo Yitong, Zhao Yingnan, Liu Zhiliang, Su Wentao, Sun Yongxin |
| 379  | 17:30-17:45 | Simulation of the Effect of Particle-bubble Size Ratio on the Collapsing Dynamics of a Cavitation Bubble Near a Particle | T Chen, H Zhang, Y Dai, J Q Yang  |
| 107  | 17:45-18:00 | Sludge solubilization method using hydrodynamic cavitation for intensification of biogas production                      | Hyungjoon Son, Yoon Joon Yong, Xun Sun  |
| 18:00-18:15 <b>Coffee Break</b>  |             |  |   |
| 18:15-20:00 <b>Session: Cavitation and Multiphase flow</b> 空化与多相流 Chair: Shuaihui Sun (Xi'An University of Technology) |             |  |   |
| 99   | 18:15-18:30 | Study of Hydrofoil Unstable Partial Cavitation Emphasizing Unstable Sheet Cavitation Phenomenon                          | Lin Wang, Fangping Tang   |
| 383  | 18:30-18:45 | Study on acoustic characteristics of bubble interaction  | Haoyang Qi, Jingting Liu  |
| 296  | 18:45-19:00 | Study on the Flow Characteristics of Piston Type Flow and Pressure Regulating Valve under Sand Containing Conditions     | Y Fu 1, S M Du, Z J An, L L Deng  |
| 105  | 19:00-19:15 | Comparisons of oxygen increment in a micropump considering the dissolved and released processes                          | Z P Ren, Z P Li, D Y Li, H J Wang, J T Liu, Y Li                                    |
| 315  | 19:15-19:30 | The influence of reservoir water level on the hydraulic characteristics of spillway tunnel (OL)                          | Chen Funan, Yao Minjie, Xue Yang, Li Gaohui, Cui Weijie                             |
| 323  | 19:30-19:45 | The influence of structure parameters on the pressure characteristics of spillway tunnel (OL)                            | Chen Funan, Yao Minjie, Xue Yang, Li Gaohui, Cui Weijie                             |
| 20:00-22:00 <b>Dinner</b>  |             |  |   |

**线上会场 Online connections:**

腾讯会议 Tencent Meeting (VooV Meeting):

ID: 695-694-861

**Plenary lecture and closing ceremony-15th**

**Tuesday, August 15, 2023**  
**Nanjiang global port (harbor) international hotel**  
**Shanghai Hall (Third floor)**

| 10:00-11:40 <b>Invited Lectures</b> Host: Qinghua Shi ((Dongfang Electric Machinery Co., Ltd.) |             |               |   |   |
|--|-------------|---------------|---|---|
| Number   | Time        | Speaker       | Title   | Affiliation/Country   |
| IL-15  | 10:00-10:20 | Maria Collins | Recent progress in pump turbine RD & Mega Kaplan  | Andritz Hydro GmbH, Austria                                       |
| IL-16  | 10:20-10:40 | Desheng Zhang | Investigation on hydrodynamic characteristics and wake evolution mechanism of pump-jet propeller with front guide vane                                    | Jiangsu University, China   |
| IL-17  | 10:40-11:00 | Jianjun Feng  | Characteristics of cavitation-induced vibration and pressure fluctuation in a bulb turbine  | Xi'an University of Technology, China                             |
| IL-18  | 11:00-11:20 | Lei Zhu       | Hydraulic Performance Advances of Pump Turbines in China: From the Perspective of Third-party Model Tests   | China Institute of Water Resources and Hydropower Research, China |
| IL-19  | 11:20-11:40 | Lingjiu Zhou  | Influence of narrow chambers and gaps on the stability of Reversible Pump-Turbines-from flow excitations to structural characteristics                    | China Agricultural University, China                              |
| <b>11:40-12:00 Coffee Break</b>  |             |               |   |   |
| 12:00-14:00 <b>Invited Lectures</b> Host: Desheng Zhang (Jiangsu University)                   |             |               |   |   |
| IL-20  | 12:00-12:20 | Jie Liu       | Pumped storage project development in China Three Gorges Corporation (CTG) and related key technologies   | China Three Gorges Corporation, China                             |
| IL-21  | 12:20-12:40 | Jiaying Lu    | Research on the unsteady flow characteristics and pressure pulsations under part-load conditions in centrifugal pumps based on dynamic mode decomposition | Xihua University, China   |
| IL-22  | 12:40-13:00 | Shengbing Li  | The 1000mw units in BHT hydropower power station  | Powerchina HuaDong Engineering Corporation limited, China         |
| IL-23  | 13:00-13:20 | Diyi Chen     | Safe and efficient operation and maintenance of hydropower units and dynamic programming of   | Northwest A&F University, China                                   |

|  |             |                    |   |  |
|--|-------------|--------------------|---|--|
|  |             |                    | Wind-Solar-Hydro power storage system with carbon peaking and carbon neutrality goals                         |  |
| IL-24  | 13:20-13:40 | Weijia Yang        | Modelling and dynamic characteristics of variable-speed pumped storage plants                                 | Wuhan University, China                        |
| IL-25  | 13:40-14:00 | Yiqun Xu           | Study on Reliable Operation of Hydropower System and Turbine-Generator Units                                  | Huaneng Lancang River Hydropower Inc, China    |
| <b>14:00-16:00 Lunch</b>   |             |                    |   |  |
| <b>16:00-18:00 Invited Lectures (Online)</b> Host: Jinyang Xue (Andritz (China) Co., Ltd.)     |             |                    |   |  |
| IL-26  | 16:00-16:30 | Håkan Nilsson      | Studies of transient operation of hydraulic machines using Open FOAM  | Chalmers University of Technology, Sweden      |
| IL-27  | 16:30-17:00 | Christophe Nicolet | Hydro-Clone: Hydropower Plant Digital Twin from Commissioning to Long Term Monitoring of Hydraulic Transients | Power Vision Engineering Sàrl, Switzerland     |
| IL-28  | 17:00-17:30 | Chisachi Kato      | The present status of large-scale industrial simulations and its future                                       | The University of Tokyo, Japan                 |
| IL-29  | 17:30-18:00 | Arun Kumar         | Collaboration in Inter laboratory comparison globally for model testing                                       | Indian Institute of Technology Roorkee, Indian |
| <b>18:00-18:20 Coffee Break</b>  |             |                    |   |  |
| 18:20-19:00 Free discussion on technical exchange Host: Ruina Xu                               |             |                    |   |  |
| 18:00-19:00 Executive Committee meeting (For executive committee member only in Fengxian Room) |             |                    |   |  |
| 19:00-20:00 <b>Closing ceremony</b> Host: Ruina Xu   |             |                    |   |  |
| Conclusion: Zhengwei Wang  |             |                    |   |  |
| Excellent Paper Award  |             |                    |   |  |
| Announcement of the next AWG-IAHR Symposium on Hydraulic Machinery and Systems                 |             |                    |   |  |
| <b>20:00-22:00 Dinner</b>  |             |                    |   |  |

**2023年8月15日，星期三**  
**南疆环球港国际酒店**  
**三层 上海厅**

| 10:00-11:40 <b>特邀报告</b> 主持: 石清华 (东方电机有限公司)            |             |               |                                   |                         |
|---|-------------|---------------|-----------------------------------|-------------------------|
| 编号  | 时间          | 演讲者           | 题目                                | 单位/国家                   |
| IL-15   | 10:00-10:20 | Maria Collins | 水泵水轮机研发和大型卡普兰的新进展                 | 安德里茨水电公司, 奥地利           |
| IL-16   | 10:20-10:40 | 张德胜           | 前置导叶泵喷推进器水动力学特性及其尾流演化机制           | 江苏大学, 中国                |
| IL-17   | 10:40-11:00 | 冯建军           | 贯流式水轮机空化引起的振动和压力脉动特性              | 西安理工大学, 中国              |
| IL-18   | 11:00-11:20 | 朱雷            | 从第三方模型试验看中国水泵水轮机水力性能的进步           | 中国水利水电科学研究院, 中国         |
| IL-19   | 11:20-11:40 | 周凌九           | 窄腔室与窄间隙对抽蓄机组流动稳定性的影响—从流动激励到结构特性   | 中国农业大学, 中国              |
| 11:40-12:00 <b>茶歇</b>                                 |             |               |                                   |                         |
| 12:00-14:00 <b>特邀报告</b> 主持: 张德胜 (江苏大学)                |             |               |                                   |                         |
| IL-20   | 12:00-12:20 | 刘洁            | 中国三峡集团 (CTG) 抽水蓄能工程开发及相关关键技术      | 中国长江三峡集团公司, 中国          |
| IL-21   | 12:20-12:40 | 卢加兴           | 基于动力学模态分解的离心泵部分负荷工况非定常流动特性及压力脉动研究 | 西华大学, 中国                |
| IL-22   | 12:40-13:00 | 李胜兵           | 白鹤滩水电站 1000 兆瓦机组                  | 中国电建集团华东勘测设计研究院有限公司, 中国 |
| IL-23   | 13:00-13:20 | 陈帝伊           | 水电机组安全高效运维与双碳目标下水风光蓄系统动态规划        | 西北农林科技大学, 中国            |
| IL-24   | 13:20-13:40 | 杨威嘉           | 可变速抽水蓄能系统模型与动态特性                  | 武汉大学, 中国                |
| IL-25   | 13:40-14:00 | 许义群           | 水力发电系统及水轮发电机组可靠运行总体研究             | 华能澜沧江水电有限公司, 中国         |
| 14:00-16:00 <b>午餐</b>                                 |             |               |                                   |                         |
| 16:00-18:00 <b>特邀报告 (线上)</b> 主持: 薛金阳 (安德里茨 (中国) 有限公司) |             |               |                                   |                         |
| IL-26   | 16:00-16:30 | Håkan Nilsson | 使用 Open FOAM 的水力机械瞬态工况研究          | 查尔姆斯理工大学, 瑞典            |

|                                       |             |                    |                           |  |
|---------------------------------------|-------------|--------------------|---------------------------|--|
| IL-27                                 | 16:30-17:00 | Christophe Nicolet | 水力克隆：从调试到长期水力瞬变监测的水电站数字孪生 | Power Vision Engineering Sàrl, Switzerland |
| IL-28                                 | 17:00-17:30 | Chisachi Kato      | 大规模工业模拟的现状与未来             | 东京大学, 日本                                   |
| IL-29                                 | 17:30-18:00 | Arun Kumar         | 针对模型测试的全球实验室间合作的比较        | 印度理工学院, 印度                                 |
| 18:00-18:20 茶歇                        |             |                    |                           |  |
| 18:20-19:00 技术交流讨论 主持: 胥蕊娜            |             |                    |                           |  |
| 18:00-19:00 执行委员会会议 (仅执行委员会成员参加, 奉贤厅) |             |                    |                           |  |
| 19:00-20:00 闭幕式 主持: 胥蕊娜               |             |                    |                           |  |
| 总结: 王正伟                               |             |                    |                           |  |
| 优秀论文颁奖                                |             |                    |                           |  |
| 下一届 AWG-IAHR 水力机械与系统研讨会预告             |             |                    |                           |  |
| 20:00-22:00 晚餐                        |             |                    |                           |  |

### Scientific tour -Altash Key Water Control Project-16th (07:00 – 22:00)

科学考察：阿尔塔什水利枢纽工程- 8月16日（07:00 – 22:00）

For participates who plan to join in this tour, please sign the *Safety Notice for Entering the Factory of Xinjiang Xinhua Yarkand River Basin Water Conservancy and Hydropower Development Co., Ltd.*, and hand it in to staff.

计划参加的参会人请领取并签署新疆新华叶尔羌河流域水利水电开发有限公司入厂安全告知交至工作人员。

## VIII. Other matters / 其他事宜

### a) Contact / 联系方式

E-mail / 邮箱: iahr2023asia@mail.tsinghua.edu.cn

Website / 网站: www.iahr2023asia.tsinghua.edu.cn

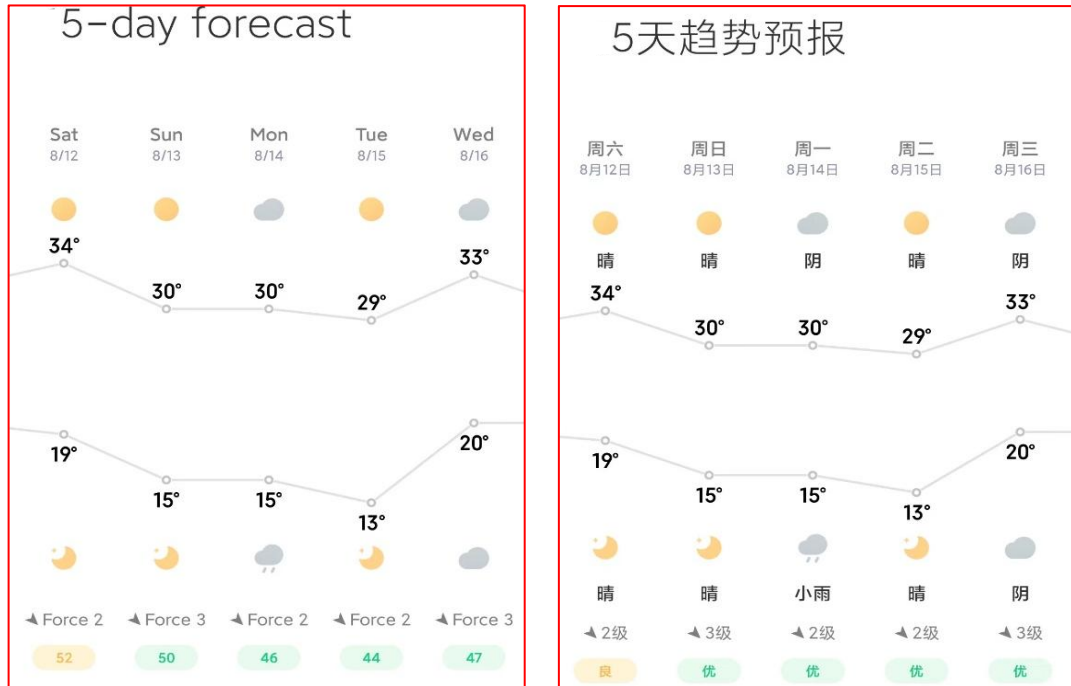
Tel / 电话:

| 姓名/ Name              | 单 位/ Affiliation                                   | 手机号/ Tel    | 备注/ Note                            |
|-----------------------|--|-------------|-------------------------------------|
| Chunan Yang<br>杨楚楠    | Tsinghua University<br>清华大学                        | 17303218612 | Conference secretary<br>会务组联系人      |
| Lei Xu<br>徐 磊         | CNNC-Xinhua Hydropower Co., Ltd.<br>中核集团新华水力发电有限公司 | 18292005894 | Conference coordinator<br>会务组联系人    |
| Zhen Li<br>李 震        | CNNC-Xinhua Hydropower Co., Ltd.<br>中核集团新华水力发电有限公司 | 18099210011 | Shuttle service<br>车辆管理             |
| Xuezhi Zhou<br>周学志    | Tsinghua University<br>清华大学                        | 18600860179 | Pick up service<br>接机服务             |
| Weiqiang Zhao<br>赵卫强  | Tsinghua University<br>清华大学                        | 18811777628 | Pick up Service<br>接机服务             |
| Huili Bi<br>毕慧丽       | Tsinghua University<br>清华大学                        | 13488712240 | Volunteer team leader<br>志愿者组长      |
| Linmin Shang<br>尚琳敏   | Xihua University<br>西华大学                           | 15208389059 | Volunteer- Session 1<br>分会场 1 志愿者   |
| Chengmin Liu<br>刘乘铭   | China Agricultural University<br>中国农业大学            | 15501133006 | Volunteer- Session 2<br>分会场 2 志愿者   |
| Dandan Yan<br>严单单     | China Agricultural University<br>中国农业大学            | 18855017866 | Volunteer- Session 3<br>分会场 3 志愿者   |
| Bo Gong<br>龚波         | Shanghai Jiao Tong University<br>上海交通大学            | 18851400759 | Volunteer- Session 4<br>分会场 4 志愿者   |
| Xiang Xia<br>夏翔       | Tsinghua University<br>清华大学                        | 15652990228 | Volunteer- Session 5<br>分会场 5 志愿者   |
| Zequan Zhang<br>张泽泉   | Jiangsu University<br>江苏大学                         | 18788866491 | Volunteer- Session 6<br>分会场 6 志愿者   |
| Xuezhi Zhou<br>周学志    | Tsinghua University<br>清华大学                        | 18600860179 | Volunteer- Session 7<br>分会场 7 志愿者   |
| Yutong Luo<br>罗雨桐     | Tsinghua University<br>清华大学                        | 13520827455 | Volunteer- Session 8<br>分会场 8 志愿者   |
| Jiayang Pang<br>庞嘉扬   | China Agricultural University<br>中国农业大学            | 15608187851 | Volunteer- Session 9<br>分会场 9 志愿者   |
| Jiahao Lu<br>陆家豪      | China Agricultural University<br>中国农业大学            | 18262776371 | Volunteer- Session 10<br>分会场 10 志愿者 |
| Yifan Wang<br>王一凡     | China Agricultural University<br>中国农业大学            | 15647245787 | Volunteer- Session 11<br>分会场 11 志愿者 |
| Yuanyuan Jiang<br>蒋媛媛 | China Agricultural University<br>中国农业大学            | 13677606042 | Volunteer- Session 12<br>分会场 12 志愿者 |

## b) Weather / 天气

The temperature difference between day and night in Kashgar is large. Please add or remove clothing according to the weather to prevent catching a cold.

喀什地区昼夜温差大，请您根据天气适当增减衣物，以防感冒。





## CO-organizers:



东方电气集团东方电机有限公司  
DONGFANG ELECTRIC MACHINERY CO., LTD.



哈尔滨电机厂有限责任公司  
HARBIN ELECTRIC MACHINERY COMPANY LIMITED



江苏大学  
JIANGSU UNIVERSITY



水利部南京水土保持研究所  
State Key Laboratory of Soil Erosion and Ecological Restoration in Northwest China



河南大学  
HENAN UNIVERSITY



浙江水利水电学院  
Zhejiang University of Water Resources and Electric Power



清华大学  
TSINGHUA UNIVERSITY



西北农林科技大学  
NORTHWEST A&F UNIVERSITY

## Supporting Organizations:



CSHE