**XJTLU-XJTU-UoL Joint Doctoral Supervision Project (Full-time)**

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| Reference No. | SFXJTU2534 |
| XJTLU School | Design School |
| PhD Programme | PhD programme in Civil Engineering |
| Supervisors | XJTLU supervisor: Dr Jelena M. Andrić<br>XJTU supervisor: Dr Sheng Zhang<br>UoL supervisor: Professor Dr Luigi Di Sarno |
| Project Title | Urban Building Cluster Morphology Optimization based on Accumulative Heat Exhaustion from Clustered Photovoltaic Systems on Urban Microclimate<br>基于光伏排热集群效应对微气候作用机制的城市建筑群形态优化研究 |
| Application Deadline | Open until the position is filled |

**Requirements:**

A UK first-class or upper second-class honours Bachelor's degree and a UK Master's degree with Merit (or their equivalent) are required for PhD admissions. Exceptional candidates holding only a Bachelor's degree may be considered on an individual basis.

Evidence of proficiency in both spoken and written English is essential. The candidate should have an IELTS (or equivalent) score of 6.5 or above if the first language is not English.

For more information about entry requirements and admission procedures of the PhD programme at XJTLU, please visit:

Entry Requirement - Xi'an Jiaotong-Liverpool University

How to Apply - Xi'an Jiaotong-Liverpool University

**Other Requirements (if any):**

The other requirements for students:

- to have completed a Master's degree in Civil Engineering or equivalent;
- excellent written and spoken communication skills in English;
- track of publications;
- interest in building services engineering; and
- experience in programming using MATLAB or Python.

**Programme Structure:**

Doctoral students in the joint programme are registered with both XJTLU and the UoL. Upon successful completion of the programme, the students will be awarded a PhD degree from the University of Liverpool.
During their doctoral studies at XJTLU, students are expected to conduct research at XJTU as visiting students. Additionally, students have the opportunity to apply for a three to six-month research visit to UoL.

**Project Description:**

This doctoral research project aims to conduct a focused, in-depth, and efficient investigation into the emerging scientific issue of the "clustered heat exhaust effect" associated with the large-scale deployment of photovoltaic (PV) systems' clusters. The project recognises that PV panels release a significant portion of unconverted solar energy as waste heat during power generation. When PV systems are densely distributed in urban areas, their decentralised heat exhaust may interact synergistically through spatial superposition and nonlinear coupling with atmospheric processes, potentially leading to a pronounced "clustering effect". This effect could counteract the cooling benefits provided by solar shading and potentially intensify the local urban heat island effect. Over a four-year period, this study will integrate methodologies from building physics and urban climatology to develop an efficient multi-scale simulation and analysis platform. Through systematic numerical experiments, it will precisely quantify the trade-off between the "negative thermal effect" of heat exhaust and the "positive shading effect" across various urban morphologies and climatic conditions, identifying the dominant mechanisms and critical thresholds. Ultimately, the research will propose an optimisation framework of urban building cluster morphology to improve photovoltaic power generation efficiency and outdoor thermal comfort. The findings are expected to provide crucial scientific evidence and forward-looking technical tools for mitigating secondary environmental risks from large-scale PV application and guiding the development of "low-carbon and cool" urban development.

**Joint Supervisory Team:**

XJTLU supervisor: Dr Jelena M. Andrić

XJTU supervisor: Dr Sheng Zhang

UoL supervisor: Professor Dr Luigi Di Sarno

**How to Apply:**

Interested applicants are advised to email Jelena.Andric@xjtlu.edu.cn the following documents for initial review and assessment (Please include the project title in the subject line).

- CV
- Two formal reference letters
- Personal statement outlining your interest in the position
- Certificates of English language qualifications (IELTS or equivalent)
- Full academic transcripts in both Chinese and English (for international students, only

the English version is required)

- Verified certificates of education qualifications in both Chinese and English (for international students, only the English version is required)
- PDF copy of Master's Degree dissertation (or an equivalent writing sample) and examiners' reports available