Title: Disproportionate Collapse Resistance of CLT Buildings

Type of award PhD Research Studentship

Department Civil Engineering

Scholarship Details A minimum £15,285 p.a. subject to eligibility criteria and award (please check below for further scholarship details)

Duration 3.5 years

Eligibility Home//EU

Start Date From September 2021

PhD Topic Background/Description
The net zero emissions commitment by 2050 has renewed the interest towards timber buildings to reduce the carbon footprint in the building sector. The use of CLT (cross laminated timber) and timber platform construction has increased over the last 10 years mainly for multi-storey residential buildings (up to 8 storeys). Buildings are designed against serviceability and ultimate limit state criteria, but they should also exhibit robustness against accidental loadings such as explosions, fire, natural disasters, or local damage due to human errors (e.g. construction deficiencies). Disproportionate collapse is a structural collapse where an initial local failure (e.g. loss of a column or a wall) causes a chain type damage disproportionate to the initial cause (e.g. collapse of structural bays). Current design guidelines on disproportionate collapse resistance of timber buildings adapt existing research on concrete and steel buildings without considering the inherent material properties of timber. Timber is a light-weight material, brittle and its mechanical properties depend on dynamic effects.

The aim of the project is to study the collapse resistance of CLT buildings accounting for the ductility, rotational capacity and strength of the connections, membrane action of the CLT floor and dynamic material mechanical properties. Ways to enhance ductility in the connectors to exploit the catenary action in CLT will be explored. The project will include both experimental and numerical work. Experiments will adopt novel measurement techniques (e.g. digital image correlations - DIC) to enable an accurate calibration of numerical models. The project seeks to inform current design guidelines on the design against disproportionate collapse and engineers towards more accurate numerical models for timber buildings.

Further Particulars
Doing research at the University of Bristol
The quality of research at the University of Bristol places it within the top five Universities in the UK based on the Research Excellence Framework and Times higher Education rankings 2014-15.
The PhD candidate will be a part of a friendly and diverse community. The University has a Doctoral College (BDC) which offers approximately 200 courses, interactive workshops, and seminars as a part of the University’s Personal and Professional Development Programme for PGR students. The BDC organises University-wide events and provides a hub of information, guidance, and resources to help researchers to get the most of their time at Bristol.

Candidate Requirements

- A First-class honours or Master’s degree in Civil/Mechanical Engineering

Basic skills and knowledge required

- Strong interest in both experimental and numerical work
- Capacity to work independently and be keen to conduct high quality research
- Excellent written and oral communication and presentation skills
- Interest in working with industrial partners

Design experience, knowledge of timber and experience with programming skills and numerical modelling would be an advantage but not essential. A recognised English language qualification is required if English is not your first language at Profile E.

Further information about [http://www.bristol.ac.uk/study/language-requirements/](http://www.bristol.ac.uk/study/language-requirements/)

Scholarship Details

This DTP studentship will cover the following for 3.5 years:

- Tuition fees at home/EU rate
- Tax free stipend
- Travel/ consumables budget

These are open to UK students and EU applicants who have been resident in the UK for at least 3 years (some constraints are in place around residence for education). [https://epsrc.ukri.org/skills/students/help/eligibility/](https://epsrc.ukri.org/skills/students/help/eligibility/). Candidates must also comply with the entry requirements of the PhD programme they wish to be considered for.

Informal enquiries

Please email Dr Eleni Toumanaki ([eleni.toumanaki@bristol.ac.uk](mailto:eleni.toumanaki@bristol.ac.uk))

For general enquiries, please email [came-pgr-admissions@bristol.ac.uk](mailto:came-pgr-admissions@bristol.ac.uk)

Application Details

To apply for this studentship submit a PhD application using our [online application system](http://www.bristol.ac.uk/pg-howtoapply)

Please ensure that in the Funding section you tick “I would like to be considered for a funding award from the Civil Engineering Department” and specify the title of the scholarship in the “other” box below with the name of the supervisor.

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