Would you like to contribute to a project to develop optimised wood solutions in the event of fire?

Join I2M, the Institute of Mechanics and Engineering (https://www.i2m.u-bordeaux.fr/), at the University of Bordeaux, France for your PhD thesis!

This Institute covers the whole spectrum of solid mechanics, fluids and energy. It is organised into six departments with specific themes. With strong institutional support, national and international recognition and close collaboration with an industrial partner, the I2M offers a stimulating working environment in its field of expertise.

Within the Civil and Environmental Engineering department (GCE) and as part of the "Safeti" project (Safe Timber Constructions in Case of Fire), **we are recruiting a PhD student**.

Main activities:

The aim of the Safeti project is to develop optimised wood solutions in the event of fire, fully meeting the safety requirements of occupants and emergency services, while ensuring that property is protected as far as possible. It is the winner of the ADEME's call for projects "Support for innovation in the construction of wood, bio-sourced and geosourced materials in France 2030". The aim of the proposed thesis is to set up calculation models to simulate the thermomechanical behaviour of wooden structural elements (columns, beams, CLT panels, etc.) subjected to all types of fire.

The originality of this project lies in the adoption of a multi-scale approach:

- Firstly, on the scale of the cross-section of a structural element, in order to simulate the humidity and pyrolysis fields at different positions in a structure. To this end, the "PATO" calculation code will be used, and will be adapted to the modelling of pyrolysis in a solid wood element subjected to a fire, whatever its severity (coupling with a fire model of the FDS or FireFoam type is planned).
- Secondly, on the scale of a real structure, by taking into account the "pyro-hydro-mechanical" coupling on the structural behaviour of various load-bearing elements. Numerical development will be carried out using the "Cast3M" and/or "Safir" calculation codes, taking into account the impact of pyrolysis and the water field on the thermal and mechanical properties of wood. Mechanical tests at different temperatures and humidity will also be carried out to analyse this aspect.

The simulations will be based on typical timber construction structures, which will be subjected to full-scale fire tests as part of the Safeti project. The numerical results will then be compared with the measurements acquired during the fire test campaign (penetration of the charring front, temperature measurements, displacements, etc.). Particular attention will be paid to the cooling phase and the return to ambient temperature of the elements tested.

At the end of the digital tool development and validation phase, a sensitivity analysis will be carried out to identify the simulation parameters that have the greatest impact. A simplification of the model could then be envisaged in order to provide a model that can be used by the profession (engineering model). Recommendations and guides for using the models will be drawn up for the industry.

Your strengths and talents:

- You have a strong base of skills in numerical simulations, code development and the use of calculation codes for thermal, solid and fluid mechanics.
- You are motivated to work on a multi-partner project with an international scope.
- You are fluent in English (written, read, spoken, at least scientific).
- Finally, initial experience in the field of timber construction and/or fire engineering would be welcome.

Further information:

By joining the I2M at the University of Bordeaux, you will be working in the Civil and Environmental Engineering department and in close collaboration with the teacher-researcher leading the project. Based in Talence - access by tram B Peixotto (tram stop), bus, bicycle. 15 minutes from the city centre of Bordeaux, a UNESCO World Heritage Site.

3-year doctoral contract.

Occasional travel is planned within France to the various partners in the Safeti project, in order to attend the various fire tests.

Please note: the position is based in a laboratory in a Restrictive Zone, which requires a pre-employment survey that may take up to 8 weeks.

Gross monthly salary: €2,100

Recruitment process: once the advert has been published, we will contact the successful candidates for an interview with the manager(s) and the recruitment officer. To be complete, your application must include your CV and a covering letter (2 pages max).

Link to vacancy: https://www.u-bordeaux.fr/universite/travailler-a-l-universite/offres-demploi/these-genie-civil-et-environnemental-fh

Email address for application: job-ref-ijubjxmnsp@emploi.beetween.com