# Research Grants for PhD students from the China Scholarship Council

**Information Form (please read the guidelines carefully on the website www-csc.utt.fr)**

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| Supervisor's name : | MANESCAU | Given names : | Brady Axel |
| Status (prof., assistant prof., …) : | Associate professor and accredited research supervisor (HDR) | | |
| Laboratory : | PRISME | Website address : | http://www.univ-orleans.fr/en/prisme |
| Institution : | INSA Centre Val de Loire | Website address : | http://www.insa-centrevaldeloire.fr/ |

Scientific competence of the supervisor:

Dr. Brady Manescau, Associate Professor at INSA Centre Val de Loire and HDR-accredited researcher, specializes in fire dynamics, reactive flows, and thermal risk in confined environments. His work focuses on ventilation effects, flame-surface interactions, and unburnt gas generation, aiming to improve models of thermal accidents. He has supervised six doctoral theses to date and is a recognized expert in CFD modeling with FDS. With over 30 publications and multiple PhD supervisions, he collaborates widely with industry and academia. His current research bridges fire safety and energy transition, including bio-based materials and hydrogen combustion.

Two major publications in the field proposed for the PhD :

1. B. Manescau, Léo Courty, Lahna Acherar, B. Coudour,Hui-Ying Wang J. P. Garo, Effects of ventilation conditions and procedures during a fire in a reduced-scale room, Process Safety and Environmental Protection,
2. B. Manescau, H. Y. Wang, B. Coudour, J. P. Garo, Influence of heat tightness of an enclosure fire on ignition risk of unburnt gases in a connected exhaust system – An experimental study, Fire Safety Journal, Vol. 109,

Website address of the personal page : https://www.researchgate.net/profile/Brady-Manescau

**Supervisor's email :** brady.manescau@insa-cvl.fr

***Description of the research work proposed for a PhD*** ***Topic # (see list) :*** VI-2

Title : Study of the Effect of Flame Oscillation on Fire Hazard Using the CFD Code FDS6

Subject :

This doctoral research investigates the impact of flame oscillation—defined by periodic fluctuations in flame shape and intensity—on fire hazard development in confined, mechanically ventilated environments. These oscillations can significantly influence heat transfer, the formation of unburnt gases, and the onset of critical phenomena such as backdraft or flashover. The study focuses on fire scenarios arising from gas leaks in sensitive storage facilities, where the coupling between ventilation conditions, fuel concentration, and oscillatory combustion governs flame behavior and hazard escalation.

A key objective of the project is the design and implementation of a digital tool capable of mapping and quantifying unburnt gas fields influenced by flame oscillations. This tool will integrate high-resolution image processing techniques with gas analyses performed using gas chromatography–mass spectrometry (GC-MS). Numerical simulations carried out with FDS6 (Fire Dynamics Simulator) will be used to support and validate this methodology. By correlating computational and experimental data, the research aims to advance understanding of the underlying physicochemical processes in under-ventilated, oscillatory fire regimes, thereby contributing to improved fire prediction and safety strategies.

Keywords :

Flame oscillation; Unburnt gases generation, GC-MS analysis,confined environment, CFD FDS6 modelling.

Expected collaborations :

This PhD is jointly supervised by Dr. Brady Manescau (HDR,INSA Centre Val de Loire, PRISME) and Dr. Rostand MOUTOU PITTI (HDR, Université Clermont Auvergne), both experts in fire dynamics. Dr. Manescau specializes in confined flame behavior, reactive flows, and enclosure effects. Dr. MOUTOU PITTI brings complementary expertise in reactive flow modeling, with a strong background in Civil, Materials, and Mechanical Engineering. Their combined skills ensure a solid foundation for advanced simulations and experimental work throughout the project.

Background required from the applicant :

The ideal candidate will hold a Master's degree in energy engineering or a related field, with a strong foundation in fire science and combustion. Expertise in ventilation effects on flame behavior and mechanisms such as flashover or backdraft is essential. Proficiency in numerical modeling, particularly using CFD tools like FDS, is highly desirable. Strong English communication skills are required for publishing and presenting research. The candidate should be motivated by high-level scientific inquiry and capable of working independently and within a multidisciplinary team.

Existence of a PDF file detailing the proposal ("yes" or "no") : Yes

*(see guidelines on the website www-csc.utt.fr)*