PhD position on
Systematic study of extinction and re-ignition modelling through finite rate chemistry in LES simulations of buoyant flames

Motivation
CFD simulations of fires are always challenging, due to the complex interaction of chemistry (combustion and pyrolysis), physics (heat transfer, evaporation) and fluid mechanics (turbulence, ventilation, mixing) in the gas phase and the solid and/or liquid phase. This project focuses on fundamental research on the turbulent combustion in the gas phase, including finite-rate chemistry in the combustion process, in order to develop improved models for extinction and re-ignition of flames in the context of compartment fires. This is very important with respect to the overall fire dynamics.

Job description
You will perform a very systematic study on fire flames. The core work concerns CFD, using the FireFOAM software package, with different turbulent combustion models: LES combined with EDC (Eddy Dissipation Concept) and CMC (Conditional Moment Closure). An essential feature is the inclusion of finite rate chemistry, which is not considered in state-of-the-art fire simulations (i.e., infinitely fast chemistry is typically assumed). You will perform an extensive literature first and then perform a very systematic analysis on the impact of model choices, chemistry mechanisms, numerical aspects and boundary conditions on the extinction and re-ignition of buoyant flames, through the combinations LES/EDC and LES/CMC. The validity of the results will be analyzed through comparison to the well-documented MaCFP target test cases.

Your profile
- You have an MSc degree in mechanical engineering or chemical engineering.
- You have good skills in written and oral communication in English.
- You are flexible, responsible and able to work independently as well as in a team.
- You have a strong interest in fire and numerical simulations.
- Prior experience with CFD (OpenFOAM) is an advantage.

What we offer
You will work in an internationally well-recognized team, with many years of experience in fire CFD simulations. Project funding is guaranteed for the entire PhD period (4 years).

How to apply
Submit your application via email before 28 February 2021 to Prof. Bart Merci (Bart.Merci@UGent.be) and Dr. Georgios Maragkos (Georgios.Maragkos@UGent.be). Applications must include:
- A cover letter in which you specify why you are interested in the position and why you consider yourself a suitable candidate (400 words max).
- Your full CV, including a full transcript of records to date (complete degrees and grade lists).
- E-mail addresses of at least two reference persons.