Université Pierre et Marie Curie - Paris6
Institut Jean le Rond d'Alembert (CNRS UMR 7190)
2, place de la gare de ceinture
78210 Saint Cyr-l'Ecole
secrétariat: 01 30 85 48 65
fax: 01 30 85 48 99

Internship opportunity

Title: Influence of the chemical composition on the sooting propensity of ternary fuel mixture

Terms: Applicants should be motivated individuals and pursue a **Master degree in Mechanical or Chemical Engineering**.

The position is expected to **start from Spring 2016** and will last 4/**6 months**. The monthly allowance is 450 euros.

Contacts:

Guillaume Legros
tél: 01 30 85 48 84
email : guillaume.legros@upmc.fr
homepage: http://www.dalembert.upmc.fr/home/legros

Alexis Matynia (alexis.matynia@upmc.fr)
Jérôme Bonnety (jerome.bonnety@upmc.fr)

Topic context: Soot represents a serious combustion hazard. Consequently, many studies have been achieved which gave significant insights of the physico-chemical processes that lead to soot formation and oxidation inside a flame. Late efforts are devoted to the characterization of the influence of the chemical composition of a fuel mixture on its soot production. Strategies for the formulation of next fuel generation could then be identified These could especially promote soot oxidation, therefore mitigate soot release into the atmosphere.

Scientific objectives: The ultimate internship objective is the evaluation of the soot production propensity by some ternary fuel mixtures and the potential optimization of their formulation with respect to the reduction of soot production.

Expected progress: The trainee will have to join a team of experimentalists to conduct experiments on the academic burner developped at Institut d'Alembert (University Pierre et Marie Curie-Paris6). This burner configuration is the one prescribed by McEnally et al,[1] which exhibits a wide soot concentration database. The experimental diagnostics to be handled is the Modulated Absorption/Emission (MAE) technique,[2] a non-intrusive technique exhibiting a high spatial resolution that enables soot temperature and concentration measurements. In parallel, the trainee will have to handle under the MATLAB environment a post-processing code that enables the interpretation of the signal provided by the MAE. In a final step, soot production propensities[3] of ternary fuel mixtures will be evaluated and compared.

References:

1 C.S. McEnally, L.D. Pfefferle, Sooting Tendencies of Oxygenated Hydrocarbons in Laboratory-Scale Flames, *Environmental Sci. Technol.* 45 (2011) 2498–2503.

2 G. Legros, Q. Wang, J. Bonnety, M. Kashif, C. Morin, J.-L. Consalvi, and F. Liu, Simultaneous soot temperature and volume fraction measurements in axis-symmetric flames by a two-dimensional modulated absorption/emission technique, *Combustion & Flame* 162 (2015) 2705-2719.

3 M. Kashif, P. Guibert, J. Bonnety, and G. Legros, Sooting tendencies of Primary Reference Fuels in atmospheric laminar diffusion flames burning into vitiated air, *Combustion & Flame* 161 (2014) 1575-1586.