POST-DOCTORAL POSITION OPENING IN JANUARY 2018

Context

New internal combustion engines, whether they operate in fuel-lean, highly diluted conditions, such as HCCI, PCCI or RCCI engines, or in highly-turbocharged downsized spark ignition modes, crucially rely on the onset or absence of **Low Temperature Combustion (LTC)** reactivity. This is driven by mechanisms that include the formation of unstable peroxides, and are highly constrained by the chemical structure of the fuel. The chemical branching associated with that chemistry is responsible for the cool flame, which is therefore of great practical importance in the high pressure conditions relevant to engine technology.

It has been proven recently that a single nanosecond discharge can **induce premixed cool flames** at pressures above the atmosphere by stimulating the LTC chemistry through the generation of a pool of radicals. The discharge induces an important reduction of the cool flame induction time, the distribution of stable intermediate products formed by the cool flame being unchanged at the millisecond timescale. It is therefore possible to **use nanosecond discharges to reduce cool flame induction times**, and make them compatible with burner studies. The dynamics of **the interactions between nanosecond plasma and LTC kinetics** however need some clarification at shorter timescales, and suggest the need for a reactor dedicated to these studies. A burner coupled with a carefully designed electrode system will be of great use to study these interactions in situ and at shorter timescales than those accessible until then.

This project therefore focuses on burner studies designed towards detailed experimental investigation of **plasma-assisted cool flames** at pressures of the atmosphere and above. In contrast with previous work that was performed using a Rapid Compression Machine (RCM), this permanent regime setup will facilitate implementation of **optical diagnostics**, and will constitute a complementary tool to the RCM.

Profile

PhD in Combustion, chemistry or mechanical engineering, with an experience in laser diagnostics and/or experimental kinetics. Good knowledge in English is required.

The candidate will be based in Lille, France. Duration: 1 year, starting in January 2018.

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