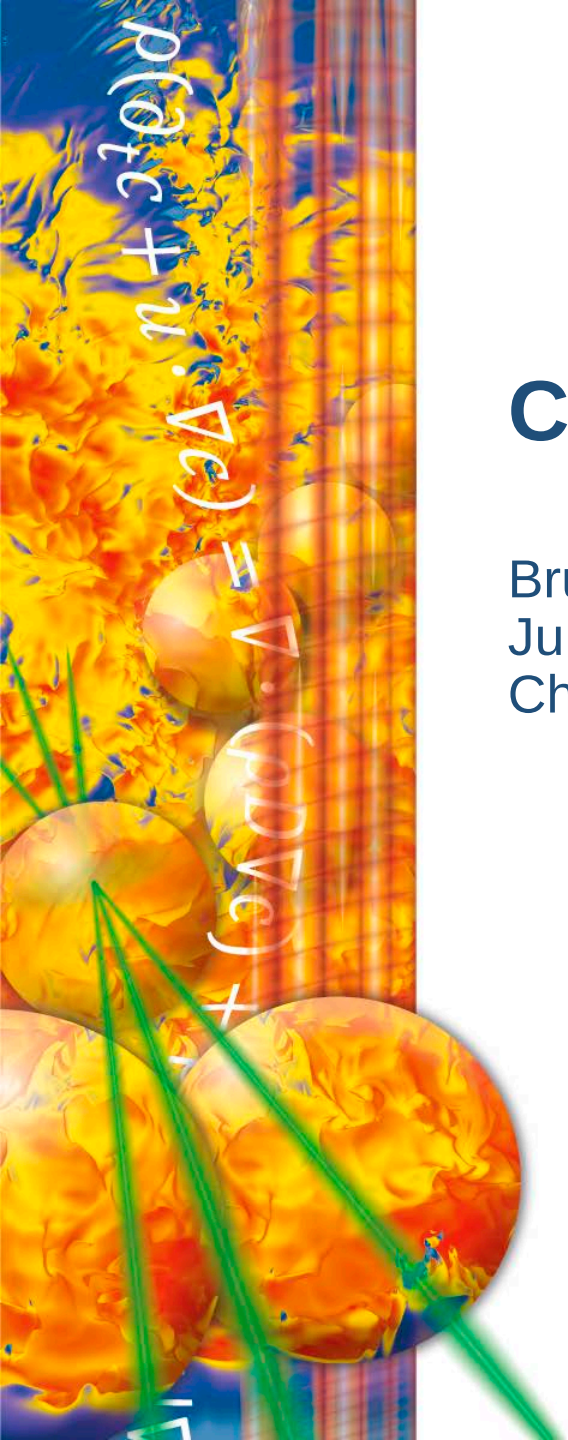

CORIA Rouen Spray Burner

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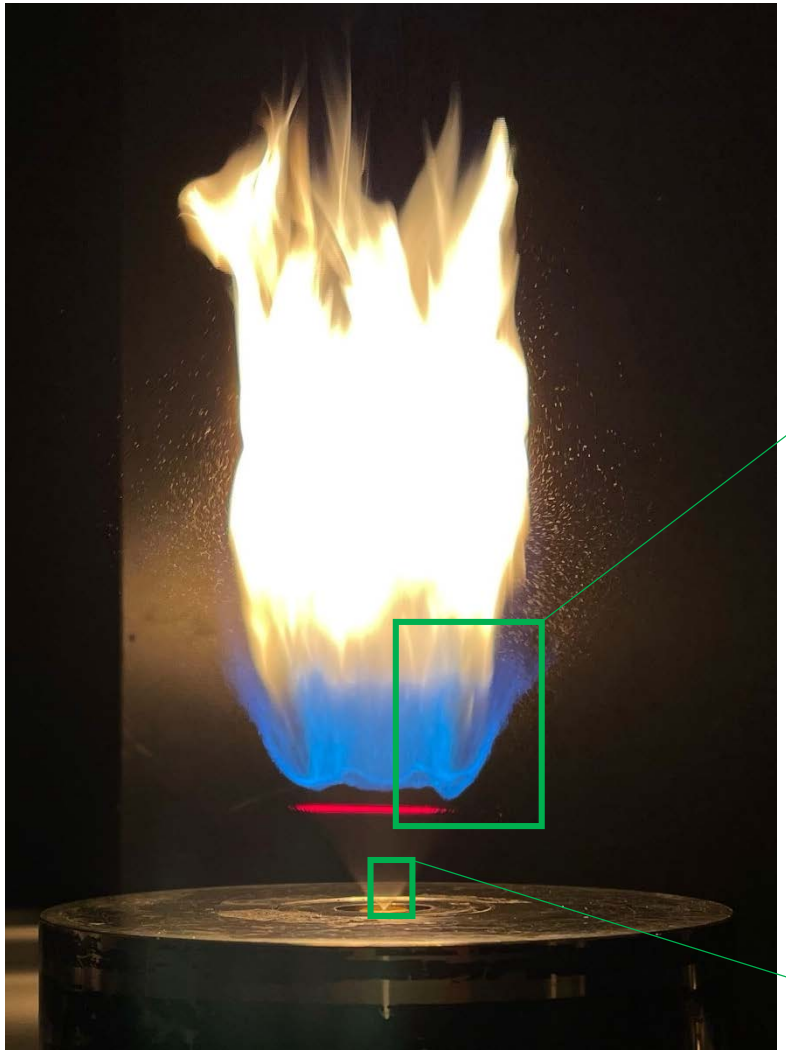
8th Workshop on Turbulent Combustion of Sprays
Luxor, Egypt, January 22nd 2023

Workshop on
Turbulent
Combustion of
Sprays

Outline and geometrical configurations



Test case n°1: Spray combustion, flame stability and pollutant emissions

Test case n°2: Spray atomisation dynamic

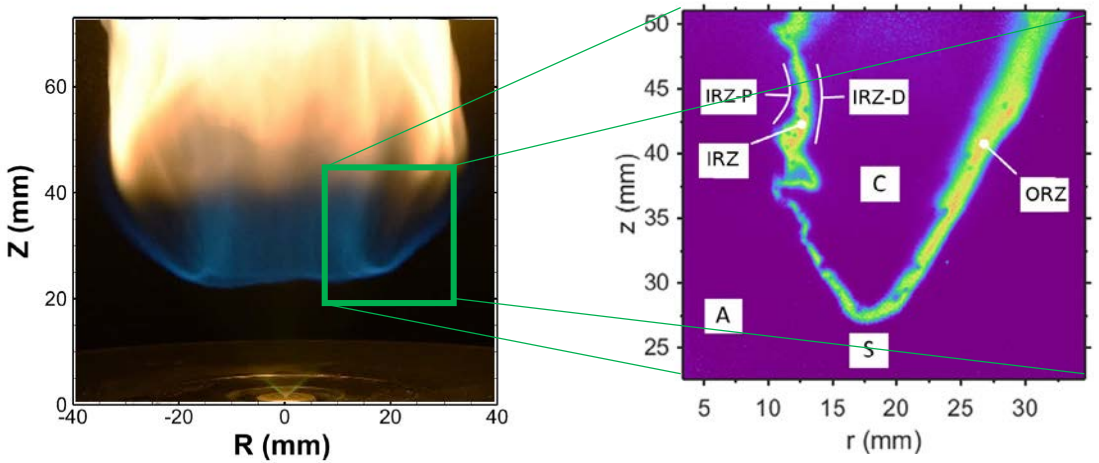
Fuel injector characteristics :

- Liquid fuel: *n*-heptane
- Fuel injector: Danfoss hollow cone (0.35 US/(gal.h) 80°.
- Pressurized Swirl injector with P ~ 8bar.

Burner characteristics :

- No flow confinement
- Non-swirling air co-flow
- Air flow rate : 6 g/s
- n-heptane flow rate : 0.28 g/s
- T = 298 K +/- 2K
- P = 1 atm

Experimental configuration : Case 1



Inputs and available measurements

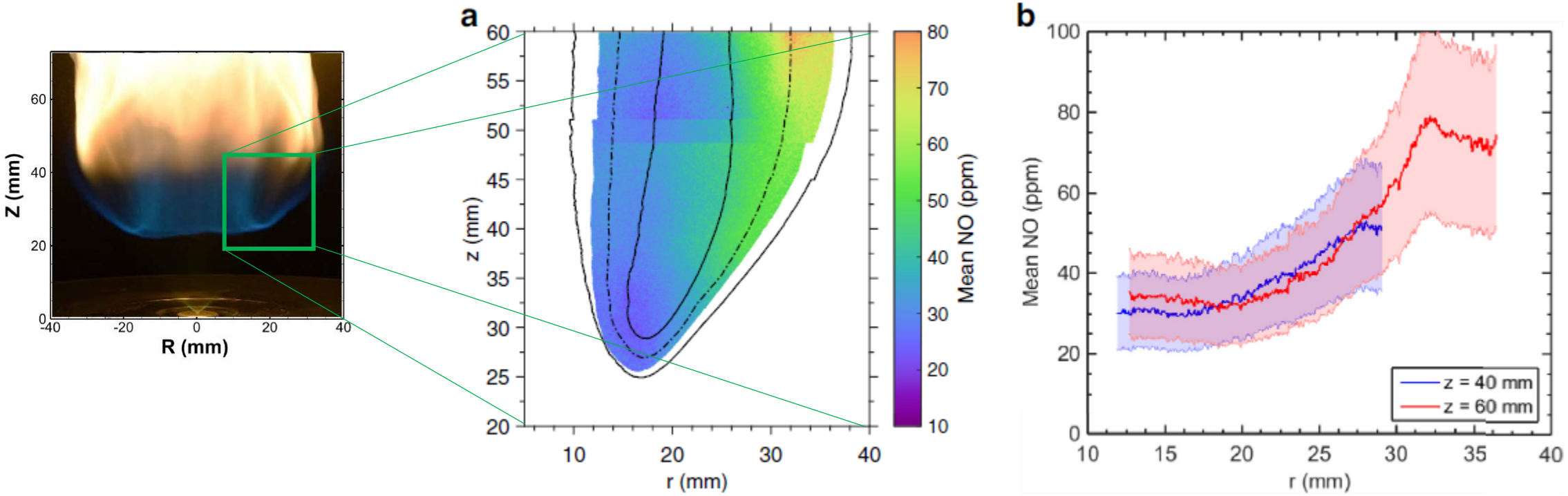
- CAD of the geometry (stp files)
- Phase Doppler Anemometry : velocity per class of size (from z= 6mm to 50 mm)
- OH-PLIF : flame structure and flame stabilization point (mean and instantaneous images). Low-speed and high-speed recordings.
- NO-PLIF : Instantaneous and mean NO mole fraction (ppm)

Flame structures:

- A : Mixing zone
- IRZ : Inner Reaction Zone
- ORZ : Outer Reaction Zone
- S : Flame leading edge
- C : Zone of burned gases and fuel droplets

CORIA Rouen Spray Burner (CRSB) Database – Access on request
https://crsb.coria-cfd.fr/index.php/Main_Page

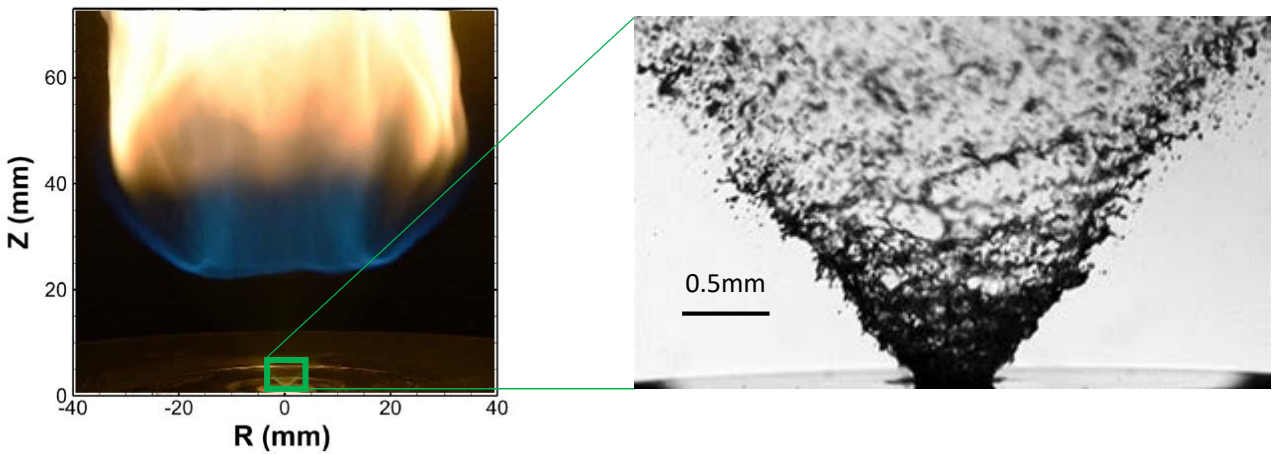
Experimental configuration : Case 1

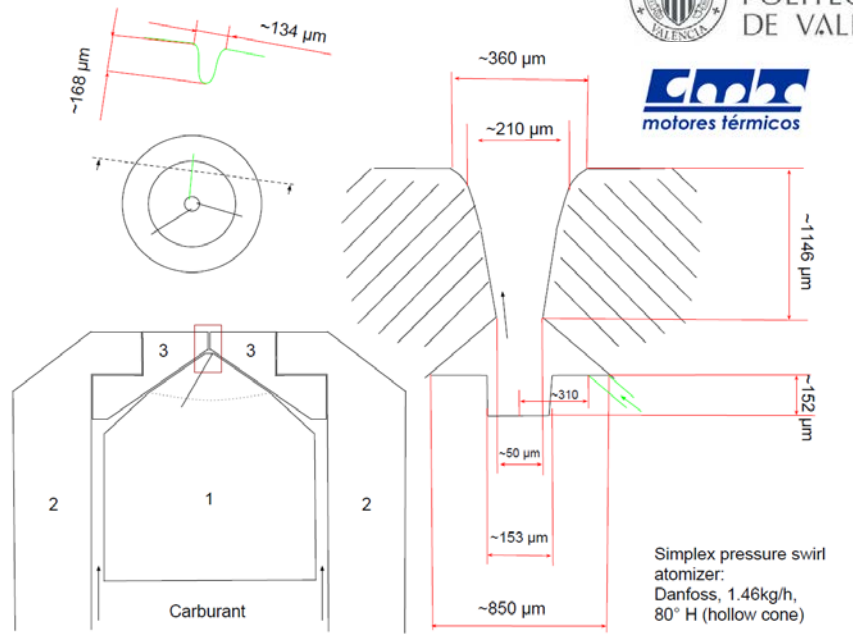


Open questions :

- Capability to predict the amount and the location of NO emission versus the local flame structure
- Sensitivity with the kinetic schemes
- NO sub mechanism involved in the NO production vs. location within the flame structure

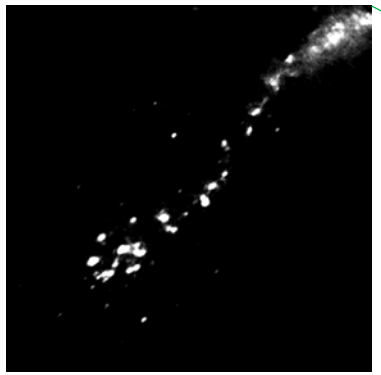
Experimental configuration : Case 2





Inputs and available measurements

- CAD of internal geometry of the atomizer
- PDA measurements from z = 3mm to 5mm
- Shadowgraphy imaging
- 2 photon PLIF with femto-second laser to perform curvature/surface analysis in the near field region



2p-PLIF (2.55 x 2.55 mm^2)