

Spray Development and Vaporization

Guidance on Experiments for “Spray G”

Experimental Objectives

- Results will be used (similar to Spray A):
 - to check the reproducibility of the measurements between facilities, operating conditions and injectors (boundary condition verification)
 - to measure possible dispersions between injectors and/or experimental installations
 - as input data for model calibration (base conditions, “Spray G”)

Experimental conditions

- From ECN2: Gasoline Spray Session
- Parameter Condition 1
- Late injection
- Fuel Iso-octane
- Fuel pressure 20 MPa
- Fuel temperature 90° C
- Injector temperature 90° C
- Ambient pressure 0.6 MPa
- Ambient temperature 300° C
- Injected quantity 10 mg
- Number of injections 1

Data Needed from Experimentalists

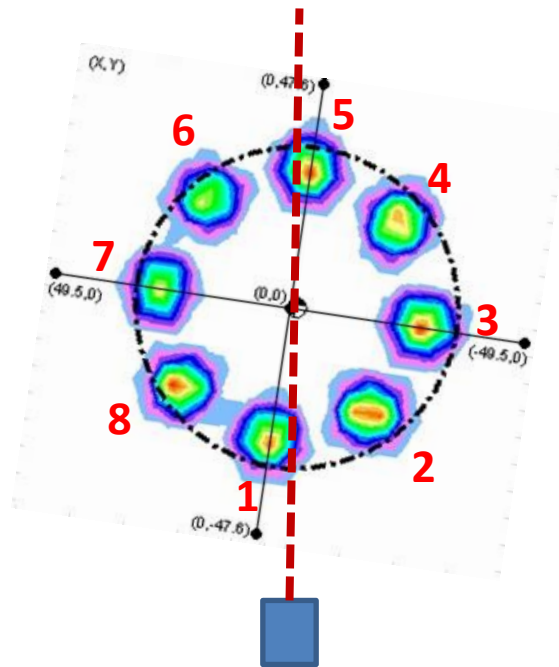
- Boundary condition measurements
 - Temperature distribution of ambient gas and injector.
- Macro-spray development and vaporization:
 - Liquid penetration vs. time (liquid-length)
 - Diffused back-illumination (DBI) is the reference technique for liquid-length measurements.
 - Mie-scattering (with head illumination) is also recommended.
 - Extinction profiles from DBI (both axial and radial)
 - Vapor-phase penetration (maximum axial penetration)
 - Measured with schlieren

Proposed ECN-3 definitions: Experiments

- Liquid penetration :
 - Diffused back-illumination (DBI) is the reference technique for liquid-length measurements. Both time-resolved and time-averaged results, based on light extinction can be provided.
- Vapor-phase penetration:
 - High-speed schlieren imaging is the reference technique. DBI may also be used before a quasi-steady liquid length is established (or before liquid evaporates at the head). Measured vapor penetration has not been very sensitive to threshold or experimental arrangement.
- Axial and radial profiles of extinction with diffused back lighting:
 - Axial (centerline) and radial (every 5 mm) profiles of light extinction can be provided for comparison (2-D map is preferred)

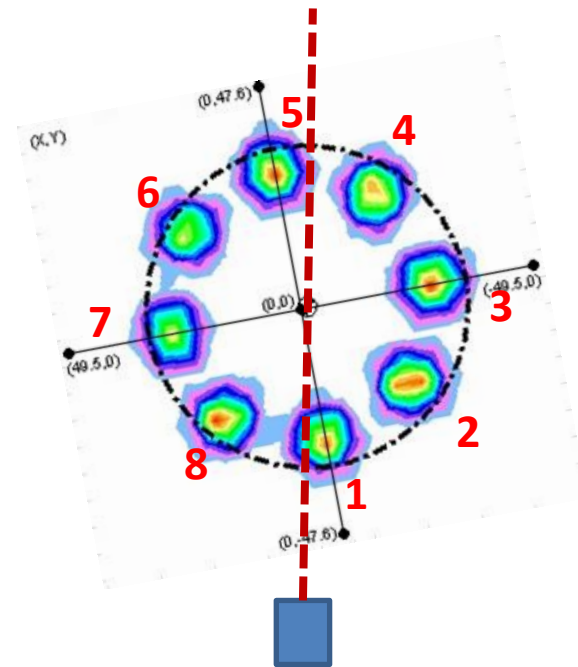
Nozzle-hole labeling

- Use electric connector to label the nozzle-hole
- Two relative locations (hole number is labeled as 1, 2, 3 ... 8.)
- Approach: the closest hole is labeled as the first one.



Electric connector

Location 1:

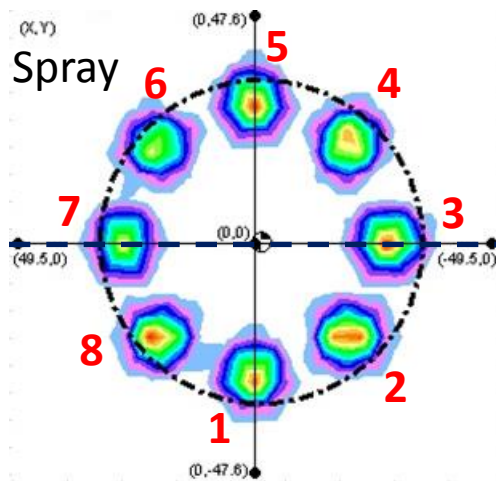


Electric connector

Location 1:

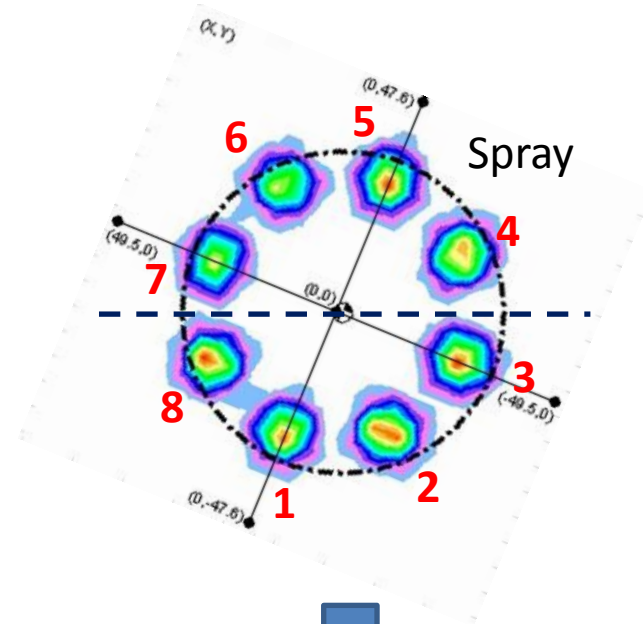
Spray position for visualization

- Position 1 is required, but position 2 is also recommended.



Camera

Position 1: Rotate injector to obtain the widest spray



Camera

Position 2: Rotate injector to obtain the narrowest spray

Quantities

<u>Quantities</u>	<u>File Labels</u>
• Liquid penetration	LPL
• Vapor penetration	VPL
• Extinction profile	LEP
• Vapor mass fraction	VMF
• Vapor mass fraction standard deviation	VSD

Format of submitted results

- This is not finished.
- Text file name and formats (Time in ms, Distance in mm)
- For liquid and vapor penetrations:
- For extinction profiles:
 - Centerline profiles:
 - Radial profiles:
- GROUP = GM, CMT, IFPEN, IM, MELBOURNE, SNL