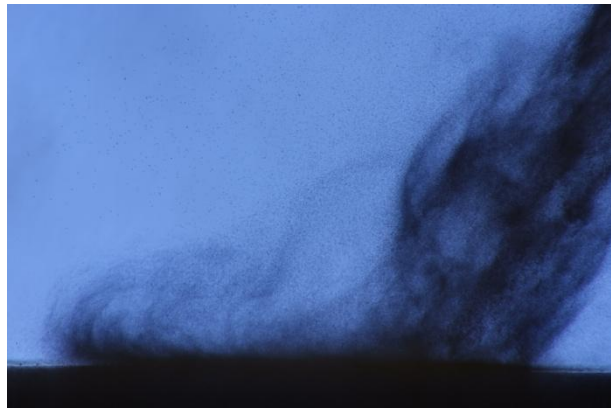
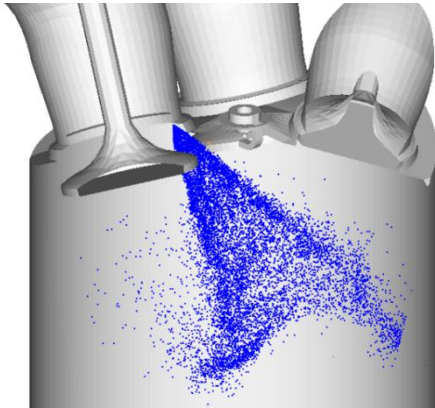


Spray-wall impact : comparison between CFD and experiments



Context:

Fuel vaporization and mixture is critical in a DI (Direct Injection) engine, as inhomogeneities are often sources of pollutant formation. Fuel is directly injected inside the combustion chamber as a spray. Due to the increasing fuel pressure, which enhances atomization, the spray may impinge on the piston or the cylinder walls. This can create liquid films, which have to be evaporated before ignition. Spray-wall impact is thus an important process in an IC (internal combustion) engine, which have to be predicted and controlled.

Description:

The trainee will study the spray behaviour near a wall and the liquid film formation using the CFD (Computational Fluid Dynamics) code Converge, and determine the influence of some parameters. Converge is a modern and innovative CFD code. It avoids the often tedious grid generation from the simulation process (only the geometry has to be provided), relies on AMR (Adaptive Mesh Refinement) to enhance accuracy and easily handles moving boundaries. Experimental measurements made internally and in research laboratories will be available to make comparisons with simulations.

To reach this objective, the student will have to:

- Get a solid background in direct injection, droplet dispersion and spray-wall impact,
- Learn to use Converge with simple test cases and post-processing tools for CFD,
- Compare simulations and experimental measurements,
- Assess the available models in Converge for drop-wall interactions and liquid film formation / behaviour.
- Propose model enhancements,
- Point out the key parameters

Depending on the work quality, the results could lead to a scientific publication.

Student profile : Engineering school or master II with a background in fluid mechanics, thermodynamics and C++ or Fortran coding. Experience in CFD is clearly an advantage.

Contact: N. Lamarque, PhD, Continental Automotive SAS, Advanced System Engineering, Hydraulic Systems.
nicolas.lamarque@continental-corporation.com