

# ADVANCED RESEARCH IN DIESEL FUEL SPRAYS USING X-RAYS FROM THE ADVANCED PHOTON SOURCE

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## ABSTRACT

The distribution and degree of atomization of fuel in the combustion chamber is a primary factor in determining the emissions from diesel engines. A number of diagnostics to study sprays have been developed over the last 20 years that are primarily based on visible light measurement techniques. However, visible light scatters strongly from droplets on the periphery of the spray. This prevents quantitative measurements using these techniques, particularly in the dense near-nozzle region.

For this reason we developed the X-ray technique to study the properties of fuel sprays. X-rays have a very low probability of scattering from droplets in the

spray, which allows them to be used to make quantitative measurements of the fuel distribution. These measurements are particularly effective in the region near the nozzle where other techniques fail.

We will present the results of our work measuring the mass distribution and density of sprays from heavy- and light-duty common rail diesel injectors, as well as our most recent work studying sprays under higher ambient density conditions.