

UCI CI-SS Laboratory Exercise

Spray 1: Droplet Size and Velocity Measurement

ELF Room#113

Duration: 80mins

Sprays play an important role in various applications, including internal combustion engines, gas turbines, and spray coating processes. Understanding the behavior of these sprays is essential for combustion efficiency, reducing emissions, and enhancing product quality. In this lab, we conduct droplet size and velocity measurements using cutting-edge techniques: Phase Doppler Interferometry (PDI) and Laser Diffraction. Through a combination of theoretical background, experimental procedures, and data analysis, we will gain practical insights into spray analysis.

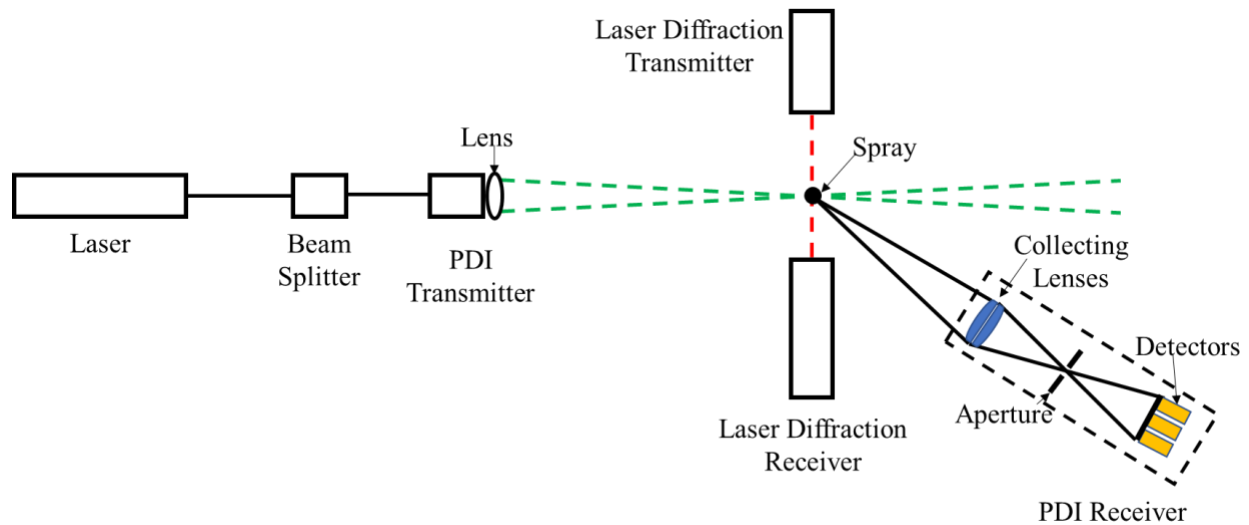


Figure Spray 1 Station Test rig

Background on Laser Diffraction

Laser diffraction is a technique used to measure the droplet size in the spray. In this method, a laser beam is directed through a dispersed sample, and the scattered light is collected and analyzed to infer the particle size distribution. When the laser beam encounters particles in the sample, it is scattered in all directions. The angle of scattering is inversely proportional to the particle size – larger particles scatter light at smaller angles, and smaller particles scatter light at larger angles. The scattered light forms concentrated circles or diffraction rings, which contain information about the particle sizes present in the sample.