Investigation of an Air-Assisted Injector for Use in Partial Premixed Fumigation of a DI Diesel Engine

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Motivation & Objectives

- HCCI Displays Low NOx and High Thermal Efficiency, However Has An Inherent Combustion Control Problem
- Premixed Charge Compression Ignition (PCCI) Allows Combustion Control, and Potential for NOx Reduction
- PCCI Combustion Increases Local Cylinder Temps.
- SwRI Determined PCCI and Diffusion Combustion Timing to be Very Critical for Overall NOx Reduction

Significant Issues:

- SwRI SAM [2003-01-034]

Engine Intake Adaptation

- Intake Surge Tank
- Fuel & Assisted Air

Injectors Parameters

- Volkswagen (Bosch) Production Air-Assisted Gasoline Fuel Injector
- SMD Less Than 20 μm [1]
- 16.73 μm SMD with Optimized Injection Parameters
- Fuel Pressure: 100 psi
- Air Assist Differential Pressure: 20 psi
- Narrow Injector Spray Cone Angle To Help Prevent Wall Wetting (~9°)

Engine Experimentation

- Investigate Phasing of PCCI and Diffusion Events
- Effects of EGR and Boost Variation
- Hardy's Parameters:
  - Boost ~200-210 kPa
  - EGR ~65-75%