

Status Update on Ducted Fuel Injection

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Abstract

Ducted fuel injection (DFI) is a strategy that can be used to enhance the fuel/charge-gas mixing within the combustion chamber of a direct-injection compression-ignition engine. The concept involves injecting the fuel through a small tube within the combustion chamber to facilitate the creation of a leaner mixture in the autoignition zone relative to a conventional free-spray configuration (i.e., a fuel spray that is not surrounded by a duct). Since the 14th ICEV, DFI has been implemented in a single-cylinder, optical engine at Sandia and tested over a range of operating conditions with conventional diesel fuel as well as oxygenated blends. This presentation provides a summary of the results from these studies. DFI is shown to be highly effective at curtailing engine-out soot emissions. Under certain conditions, DFI can attenuate engine-out soot by over 100X. In addition, DFI enables the engine to be operated at low-NO_x conditions that are not feasible with conventional diesel combustion due to excessive soot emissions.

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