Spray Control for Maximizing Energy Efficiency and Minimizing Emissions in Combustion Engines

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ABSTRACT

Liquid Fuel Injection in automobile, diesel, gas turbine and other internal combustion engines, plays a key role in engine performance. Phase Doppler and other laser diagnostic techniques provide detailed information on drop size, velocity and trajectory from which evaporation rates and local air/fuel ratios can be determined. Computational Fluid Dynamic and Kinetic systems prescribe local fuel/air mixture ratios for maximizing overall energy efficiency and minimizing formation and emission of pollutants for different load conditions. Atomization can be achieved by a wide range of pressure, fluid dynamic, electrostatic, acoustic and vibration techniques. Tangential injection of both liquid fuel and air into injectors, generate swirling flows with both tangential and axial shear forces which reduce drop size. Extensive, specialized research has been reported at the International Institute of Liquid Atomization and Spray Systems and published in the journal 'Atomization and Sprays'. The talk would highlight the influence of spray control on energy efficiency and emissions.