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**SPRAY CHARACTERIZATION FROM COMMON RAIL INJECTION SYSTEM
FOR USE IN LOCOMOTIVE ENGINES**

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ABSTRACT

New U.S. Environmental Protection Agency regulations are forcing locomotive manufacturers and railroads to reduce pollutant emissions from locomotive operation. Locomotive engines will be required to meet the applicable standards at the time of original manufacture. A variety of emissions-reduction technologies can be used, such as alternative fuels, additives in lubricant oil, and after-treatment technologies (e.g., selective catalytic reduction and particulate traps). Emissions reduction can also be accomplished inside the cylinder, using advanced diesel fuel injectors that have a significant impact on the quality of spray and charge preparation before engine combustion and subsequent events. High-speed optical measurements have been collected at elevated ambient pressures for sprays from a modular common rail injection system at Argonne National Laboratory in order to investigate spray structure and dynamics. High-speed laser imaging was used to explore the effects of various parameters on the spray structure. The experimental parameters included were ambient gas density, injection pressure, number of spray holes, injection strategy, and internal orifice size. Spray symmetry and structure were found to depend significantly on the nozzle geometry or manufacturing variances and the operating conditions.