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Laser-induced incandescence and elastic-scattering measurements of particulate-matter volume fraction changes during passage through a dilution tunnel

by

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ABSTRACT

Modern diesel engines produce far less mass of particulate matter than their predecessors, but this advance has been achieved at the expense of a significant increase in the number of sub-micron sized particles. This change in soot morphology has created the need for new instrumentation capable of measuring small volumes and sizes of particulate matter in a reasonable period of time, and preferably in real-time. Laser-induced incandescence and laser elastic scattering are complementary techniques suitable for this task. Optical measurements are presented for a diesel engine exhaust and compared with measurements performed using a scanning mobility particle sizer. This study investigates the effects of exhaust dilution and temperature control of the sampling system. It is also shown that laser-induced vaporization of low temperature volatile material is a potentially valuable technique for measuring the volatile component of exhaust particulate matter.