Colin Welburn

Thesis

Characterization of Particulate Matter Emissions from Motor Vehicles

Abstract

Fine particulate matter (PM2.5) in motor vehicle exhaust is a significant contributor to ambient PM2.5 concentrations, which have been linked to human health effects. Characterization of motor vehicle PM emissions is particularly challenging due to the effects of dilution pattens on the collected PM samples.

Exhaust from gasoline-fueled motorcycles and one diesel-fueled bus were studied using a chassis dynamometer and dilution tunnel for different combinations of driving cycle, fuel, ambient temperature, and after-treatment. PM2.5 mass emission rates and compositions expressed as elemental and organic carbon (EC/OC) and ionic species were determined from samples collected on filters. A dilution model was developed to assess and compare on-road dilution processes with laboratory conditions.

The current testing methodology for gaseous emissions from light duty gasoline vehicles and PM emissions from heavy-duty diesel vehicles was inadequate for quantitative characterization of PM2.5 emissions from the motorcycles.

Degree

M.Eng.

Completion

2001

Supervisor

Karman