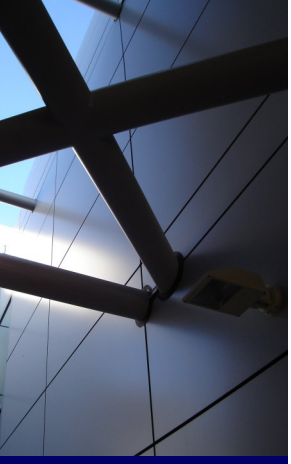

MECHANICAL ENGINEERING

The Department of Mechanical Engineering presents:

The Master's Dissertation Defense of:

Michael Grady

Tuesday, December 3, 2013, 9-11AM
Bourns Hall A171

On-Road Air Quality and the Effect of Partial Recirculation on In-Cabin Air Quality For Vehicles

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Abstract:

The California Air Resource Board (CARB) recently reported that due to exposure to particle emissions, 9,000 people die annually in California alone [11]. A method for quantifying the exposure during a daily commute as well as reducing the exposure for the passengers has been developed. A fractional recirculation of cabin air was proposed and studied to improve cabin air quality by reducing cabin particle concentrations. Vehicle tests were run with differing number of passengers (1, 2, 3, and 4), four fan speed settings and at 20, 40, and 70 mph. A manual control was installed for the recirculation flap door so different ratios of fresh air to recirculated air could be used. Full recirculation is the most efficient setting in terms of thermal management and particle concentration reduction, but this causes elevated CO2 levels in the cabin [5]. The study demonstrated cabin CO2 concentrations could be controlled below a target level of 2000ppm at various driving conditions and fan speeds with more than 85% of recirculation. Additionally, some energy saving is also expected with the air conditioning system. More recirculation means less energy is required to cool the cabin air, as opposed to cooling 100% outside air under hot weather conditions. The proposed fractional air recirculation method is a simple yet innovative way of improving cabin air quality.