

Characterization of Vehicle Exhaust Emissions by Remote Sensing

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ABSTRACT

The purpose of this study is to explore the distribution and properties of automobile exhaust pollution through a statistical approach so that the distribution of the high pollution vehicle group can be located and consistency influential factors related to pollutants (CO, HC, NO) can be discussed. According to the results of the study, the CO consistency exhausted by over 82% of vehicles is below 1%. The exhausted HC consistency has an identical result since more than 81% of vehicles have a low consistency under 200 ppm. The exhausted CO or HC consistency has a direct proportion against the age of the vehicle (the date of production); i.e., the average consistency increases along with the increase of the age of the car. Just like the pollutants of CO and HC, the NO consistency has a very gradient distribution as well, which applies to the ' gamma distribution ' in terms of statistics. The NO consistency exhausted by 14.8% of vehicles exceeds 2,400 ppm and corresponds to ' No gross polluters ' of exhausted NO at 50%. After comparing the correlation of each independent testing data between NO and HC or No and CO, the regression coefficient is below 0.1 If a 10-portion scale is served as the reference for classifying NO consistency, a direct proportional tendency with lower consistencies (90% of the vehicles) can be discovered after locating the relationship of pollution consistency between NO and HC and between NO and CO. After conducting a difference analysis on the testing results over five times, the distribution of the coefficient of variation for CO, HC and NO tends to be similar and ranges between 20 thru 100. When the location, the range of acceleration, the exhaust volume and the date of production are specified to be the same, the coefficient of variation would fall around 70, which can be classified in the same group. For general linear model analysis of variance, only the testing location imposes significant impact upon the coefficient of variation.

Keywords : Remote Sensing ; Gross polluters ; Repeated testing ; Coefficient of variation

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