Statistical Methods for Estimating Speed Correction Factors with Confidence Intervals for Mobile Source Emissions Models

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ABSTRACT

Speed correction factors are an important component of mobile source emissions models. The current "ratio of means" methodology used by the California Air Resources Board (CARB) and the U.S. EPA does not provide estimates of error or account for the dependence in the data. A repeated measures regression method that takes into account the dependence in the data and provides estimates of error is proposed and illustrated using recent emissions data from CARB. A method for calculating confidence intervals for the ratio of means is also derived and illustrated. Using the same dataset, we find that the method currently in use, which fits a polynomial curve to the ratio of mean emissions, slightly underestimates the correction factors when compared with the repeated measures method. However, both methods appear to overestimate values in the middle range of speeds when compared with a method that does not assume a polynomial curve.