Link:
https://www.sciencedirect.com/science/article/abs/pii/S1361920919312507?via%3Dihub

Transportation Research Part D: Transport and Environment
Volume 82, May 2020, 102294

Driving cycles that reproduce driving patterns, energy consumptions and tailpipe emissions

Luis F. Quirama [a], Michael Giraldo [b], José I. Huertas [c] ✉, Miguel Jaller [d]

Show more

+ Add to Mendeley Share Cite

https://doi.org/10.1016/j.trd.2020.102294

Get rights and content

Abstract

This study presents the Energy Based Micro-trip (EBMT) method, which is a new method to construct driving cycles that represent local driving patterns and reproduce the real energy consumption and tailpipe emissions from vehicles in a given region. It uses data of specific energy consumption, speed, and percentage of idling time as criteria of acceptable representativeness. To study the performance of the EBMT, we used a database of speed, fuel consumption, and tailpipe emissions (CO_2, CO, and NO_x), which was obtained monitoring at 1 Hz, the operation of 15 heavy-duty vehicles when they operated within different traffic conditions, during eight months. The speed vs. time data contained in this database defined the local driving pattern, which was described by 19 characteristic parameters (CPs). Using this database, we ran the EBMT and described the resulting driving cycle by 19 characteristics parameters (CPs*). The relative differences between CPs and CPs* quantified how close the obtained driving cycle represented the driving pattern. To observe tendencies of our results, we repeated the process 1000 times and reported the average relative difference (ARD) and the interquartile range (IQR) of those differences for each CP.. We repeated the process for the case of a traditional Micro-trip method and compared to previous results. The driving cycles constructed by the EBMT method showed the lowest values of ARDs and IQRs, meaning that it produces driving cycles with the highest representativeness of the driving patterns, and the best reproduction of energy consumption, and tailpipe emissions.

DOI: https://doi.org/10.1016/j.trd.2020.102294