

Pilot Demonstration of the Use of Probe Vehicles from Naturalistic Driving Studies to Measure Road Ride Quality

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New vehicle technology is leading to efficient methods for assessing the condition of the national highway system. Utilizing simple sensors installed in vehicles, such as accelerometers, could provide a cost effective way to assess ride quality for pavement management. This paper reports on a pilot study that compared data gathered from accelerometers used for Naturalistic Driving Studies to the current state of the art practices for measuring ride quality. The presentation will first present a review of relevant previous studies involving probe vehicles. Based on this review, a pilot study that evaluates the use of probe vehicles acceleration measurements to evaluate pavement profile was performed. Repeatability of acceleration measurements using cross-correlation and standard deviation was obtained. Using visual methods and the coherence function, acceleration measurements were compared to profile measurements obtained from inertial profilers.

The literature review reinforces that the use of probe vehicles for pavement condition data collection is very promising and that measuring pavement condition with typical onboard sensors can provide a cost-effective way to collect data for pavement management. The most practical use of probe vehicles in pavement management applications is the use of vehicle accelerometers and GPS to describe ride quality. The pilot study confirmed that the acceleration runs are very repeatable. Visual inspection of the acceleration and profile plots suggested that the acceleration profiles and smoothness measurements are very similar. Analysis using the coherence function also confirmed this strong relationship. The tested methodology provides a practical way to evaluate smoothness while providing a wider base of coverage compared to inertial profilers.

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