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VALIDATION OF AN ON-BOARD VEHICLE PERFORMANCE AND EMISSIONS MONITORING SYSTEM SUITABLE FOR FLEET APPLICATIONS

R.J. North, W.Y. Ochieng, R.B. Noland, J.W. Polak
Centre for Transport Studies, Department of Civil and Environmental Engineering, Imperial College London, London, UK

Air pollution due to transport is seen as an important component in emissions inventories. Techniques to measure real world activity and emissions patterns from in-use vehicles are now focused around the use of on-board emissions monitoring technologies. The Vehicle Performance and Emissions Monitoring System (VPEMS) has been developed by Imperial College London and our industrial partners for use in monitoring multiple vehicles simultaneously. It is a platform capable of simultaneously measuring tailpipe emissions (CO, CO2, NOx, O2 and HC), in-cabin exposure to pollutants and vehicle performance data. These data are then time and position stamped using GPS and transmitted to a base-station over a GSM link. At the base-station the data are collated into a coherent spatially and temporally referenced database that can be formatted for integration with a wide range of analysis tools. This paper presents the results of the validation and characterisation testing performed on the prototype system. It describes in detail the results obtained from benchmark testing the system against an industry standard chassis dynamometer over standard regulatory cycles. The results show impressive levels of agreement, especially once the raw concentration measurements are converted to mass emissions. This serves to demonstrate the technological feasibility of comparatively simple on-board emissions measurement systems. Preliminary field trial data is then presented to demonstrate the system capabilities in real-world operation. An analysis of the data required for various regulatory purposes is also presented, and the extent to which the data provided by VPEMS satisfy these needs is discussed.