

Comparison of non-invasive sensors and road sensors for the usage in section control systems on motorways

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ABSTRACT

Within section control systems on motorways drivers get information about adequate speed limits during adverse weather situations. Therefore road weather data are necessary. To detect the danger of aqua-planing measurements of precipitation intensity and waterfilm thickness as well as the status of the road surface are needed. To detect these atmospheric data different weather sensors are located near the motorway. There are two different sensor systems available which detect these measurements at the moment. For the detection of the status of the road surface, like dry, moist or wet, the sensor is imbedded directly in the road surface in most cases. The other sensor system is non-invasive which can be installed next to or over the road. Nowadays more and more open-pored asphalt is used because of its advantage to be less noisy and its property to drain off water better than normal asphalt. But this kind of asphalt cannot be cut to install a road sensor therefore the usage of non-invasive sensors will be increase in the future.

Within the German Test Site for Road Weather Stations [1] various road sensors as well as various non-invasive sensors are installed. The data for both detection technologies has been collected for the last 2 years and allows a statistically valid comparison of them. In this paper the advantage and disadvantage of the two sensor technologies will be shown for the measurements waterfilm thickness, road surface and road temperature. In order to describe the behavior of the sensors, the available data will be analyzed concerning the availability of valid datasets and the accuracy. Additionally the performance of the sensors is examined during periods of different clusters of traffic volumes.

The measurements of waterfilm thickness, road surface and road temperature are very important for automatic traffic control algorithms [2] as a speed limit caused by rain is derived and shown on variable message signs. In the German Technical Bulletin [2] a matrix with the two measurements precipitation intensity and water film thickness define which wetness-level is detected. There are 5 wetness-levels which cause different speed limits. For the first supply thresholds are given based on the experiences with road sensors. For the newer non-invasive sensors other thresholds may be necessary. This paper will show some

possible thresholds for the precipitation/waterfilm thickness matrix and their effects on the speed limits shown on the variable message signs.