

## **Evaluation of Current Methods for Estimation of Tire-Pavement Friction based on Vehicle Dynamics for Pro-active and Sustainable Winter Maintenance**

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To ensure the safety of the road users during inclement weather, highways agencies perform winter maintenance operations. These operations include anti-icing/de-icing operations and plowing. This process can be costly and it can also pollute the water resources. Being able to determine the optimum timing for the treatment and the amount of chemicals that must be applied to achieve a safe surface condition can be crucial for highway agencies. Furthermore, the amount of deicing material applied to the road can be adjusted based on available friction level. Therefore, real-time surface friction measurements can provide useful information for pro-active winter maintenance. The feasibility of using friction for improving winter maintenance practices has been evaluated in the National Cooperative Highway Research Program (NCHRP) Project 6-14. According to the result of this project most practitioners agree that the use of friction will improve winter maintenance practices and it can be useful for allocating snow-fighting resources in real time.

Real-time estimation of tire-pavement friction can be achieved using vehicle dynamics and sensors installed in probe vehicles used for Naturalistic Driving Studies. Existing signals from modern vehicles sensors can be used to estimate tire-pavement friction. The presentation will review the available techniques for estimating tire-pavement friction based on vehicle dynamics and in vehicle sensors and proposed a methodology to use that information for supporting winter maintenance operations. The most promising techniques that can be used to estimate the real time friction on snowplows are identified and a prototype decision support system proposed.

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