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## Measuring skid resistance of hot mix asphalt using the aggregate image measurement system (AIMS)

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### HIGHLIGHTS

- Different aggregates were evaluated using digital image processing.
- Different HMAs composed by those aggregates were also investigated.
- Aggregates were analyzed in respect to its angularity and surface texture.
- Mixtures were analyzed in respect to texture characteristics.
- Correlations between DIP and conventional HMA texture are not as good as expected.

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### ABSTRACT

Pavements need to have adequate structural, geometric and signaling conditions, in order to prevent accidents and to ensure safer transportation. In Brazil, asphalt pavement projects require proper volumetric and structural parameters, where as functional aspects, such as tire–pavement friction, are not always considered in the asphalt mixtures design. One of the most important factors in the tire–pavement friction is the asphalt mixes texture. In this context, the main objective of the present study is to evaluate a method for characterization of asphalt mixtures texture properties using digital image processing (DIP) techniques, demonstrating how these results can be correlated to the results of conventional tests and to the aggregate particles' shape properties, such as angularity and surface texture. For this purpose, three hot mix asphalt (HMA) with different aggregate gradations and composed by aggregates with different shape properties were analyzed. Two HMA used in road pavements were produced, one with aggregate particles in their original form, and the other one with polished aggregate particles. The third mix was a HMA used in airport pavements, produced with non-polished aggregate particles. Besides these three mixes evaluated in the laboratory, four HMA used in the field were analyzed in order to compare the results obtained from the DIP, and the ones obtained using conventional texture and skid resistance tests. The results showed that the correlations between the HMA texture properties obtained using DIP and those obtained through conventional tests are not as good as expected. Moreover, the results indicated that the HMA particle size distribution directly affects its texture characteristics. Regarding the aggregate particles shape properties, it was found that small variations in these properties do not provide major variations in the results of HMA texture obtained by the DIP technique.

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### 1. Introduction

Traffic accidents can be a combination of many factors, including drivers' imprudence and pavements conditions. Accident rate can be reduced if safety improvements are provided by analyzing

parameters that affect pavement friction. A main safety criterion for asphalt pavements is the tire–pavement interaction. It is expected that the pavement surface provides safe and comfortable conditions to its users, and this is directly related to adequate surface texture characteristics, which contributes to skid resistance and to surface drainage. The evaluation of hot mix asphalt (HMA) surface texture generally includes the study of micro and macro-texture characteristics. Microtexture is usually related to the aggregate particles characteristics, while macrotexture is related

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