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Evaluation of the Skid Resistance of Asphalt Concrete Made of Local Low-Performance Aggregates Based on New Accelerated Polishing Machine

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Abstract : This paper presents the results of a laboratory experimental study that explores the skid resistance of asphalt concrete mixtures made of local low-performance aggregates by partially replacing sand with olive mill waste (OMW). OMW was mixed with aggregates using a dry process by replacing sand with contents of 5%, 7%, 10% and 15%. The mechanical performances of the mixtures were evaluated using the Marshall and Duriez tests. A modified accelerated polishing machine was used as polishing equipment, and a British pendulum tester (BPT) was used to test the skid resistance of the samples. Finally, texture parameter analysis was performed using scanning electron microscopy (SEM) and Mountains Map software to assess the effect of OMW on the friction coefficient evolution. Using a distinct road wheel for a modified version of an accelerated polishing machine, which is normally used to determine the polished stone value of aggregates, the results showed that the addition of OMW up to 10% conferred a better skid resistance in comparison to normal asphalt concrete. The presence of olive mill waste in the mixture until 15% guarantees a gain of 22%-29% in skid resistance after polishing compared with the reference mix. Indeed, from texture parameter analysis, it was observed that there was differential wear of the lightweight aggregates (OMW) compared to the other aggregates during the polishing process, which created a new surface microtexture that had new peaks and led to a good level of friction compared to the mixtures without OMW. In general, it was found that OMW is a promising modifier for asphalt mixtures with both engineering and economic merits.

Keywords : skid resistance, olive mill waste, polishing resistance, accelerated polishing machine, local materials, sustainable development.
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