

Effect of rubber incorporation on the behavior of pavement cemented mixtures under cyclic flexural loading: A preliminary study

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The main purpose of this study is to investigate the effect of replacing natural aggregate with crumb rubber on the behavior of cement-stabilized crushed aggregate mixtures subjected to cyclic flexural loading. This behavior is evaluated in terms of fatigue life and resilient flexural modulus. The damage to the modified mixtures was also examined utilizing permanent deformation accumulation and degradation of resilient flexural modulus during a fatigue test. To ensure the same packing of aggregate mixture, the natural aggregate was replaced by waste tire rubber particles of similar gradation. Four volumetric replacement percentages (0 %, 15 %, 30 %, and 45 %) of the 6-mm fraction size were utilized. The results revealed that the inclusion of rubber improves the fatigue life of cement-stabilized aggregate mixtures and reduces the resilient flexural modulus. Damage investigation showed that the rubber has little effect on the degradability of the modulus during fatigue. However, more permanent deformation was accumulated after modification with crumb rubber. It was observed that the applied stress ratio affected the different phases of permanent deformation accumulation. It is suggested that the mechanism of fatigue improvement of rubberized mixtures occurs by delaying crack propagation and absorbing the energy during the microcracking stage.