Review of Techniques, Approaches and Criteria of Hot-Mix Asphalt Fatigue

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Abstract

Fatigue cracks were observed in the 1800s in steel structures—bridge and railroad—in Europe because of cyclic loading; since then, fatigue has been extensively studied in various fields. Several techniques, approaches, and criteria were developed to achieve this purpose. The first fatigue study on hot mix asphalt (HMA) was performed at Nottingham University in the 1950s; since then, a massive amount of work has been done. This paper provides a review survey of fatigue studies of asphalt mixtures; this survey includes demonstrating fatigue test techniques, test modes, load configurations, approaches, and criteria. These approaches range from simple, such as the traditional approach, to complex, such as the mechanistic approach, and can be used in evaluating the fatigue performance of asphalt binders and mixtures, except for the linear amplitude sweep (LAS) test, which is used only for binder and mastic. A French approach was developed to depict asphalt fatigue performance only from a pure fatigue damage perspective without due regard to other artifacts that occur during the fatigue damage process.