

INVESTIGATING FACTORS AFFECTING HOT MIX ASPHALT FATIGUE BEHAVIOUR USING FACTORIAL ANALYSIS

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ABSTRACT

The fatigue characteristics of asphalt play an important role in pavement design. Asphalt's fatigue performance is influenced by a number of different factors (i.e. strain, temperature, stiffness, etc.), and therefore the fatigue life of asphalt can be difficult to accurately characterise. Traditionally, fatigue studies look at the effects of these factors individually and, as such, fatigue models are largely developed using a fixed temperature and frequency. This approach fails to address how the interactions between these factors may impact fatigue life. The aim of this study is to investigate the effects of strain, temperature, and frequency on the fatigue behaviour of hot mix asphalt, and their interaction. Four-point flexural beam tests were carried out, with a typical New Zealand hot mix asphalt, at different strain levels (400, 500, and 600 $\mu\epsilon$), temperatures (10°C, 20°C, and 30°C), and frequencies (5 and 10 Hz). An analysis of variance showed that the effect of strain amplitude is the most significant factor followed by temperature and the interaction of strain and temperature. A model relating the fatigue life as a function of these significant factors was also developed.

KEY WORDS: Asphalt, fatigue, factorial design, factors, model and effects