

A new methodology to obtain the fatigue laws of asphalt mixtures based on a strain sweep test

Fatigue cracking of asphalt mixtures is associated with the deterioration produced by the application of repeated loads lower than the maximum loads that the material can withstand before breaking.

This phenomenon depends on the environmental conditions under which mixtures are exposed during their service life. Normally, fatigue cracking is simulated in a laboratory by time sweep tests. These tests allow the fatigue behaviour of the material to be analysed by obtaining the fatigue laws, which relate to the number of cycles that the mixture is able to withstand with the applied strain or stress.

These laws are a key tool to address the dimensioning of asphalt pavements. However, the time required to obtain the fatigue laws to study essential variables in the fatigue behaviour of a mixture makes their use impossible.

The EBADE (Spanish acronym for Ensayo de BARRido de DEformaciones) is a strain sweep test presented as an experimental and a speedy implementation procedure, which consists of applying a series of tension-compression load cycles at different strain amplitude levels, which increase progressively until the mixture breaks.

From the results of this test, a method to estimate the fatigue laws has been developed. This method allows key variables such as the type of binder used in the mixture, the effect of aging or the test temperature on the fatigue of the asphalt mixtures to be studied.

This study would be impossible with the classic time sweep tests, due to the excessive testing time they require. Furthermore, an iterative procedure is developed to analyse whether a specific pavement section may be critical depending on the mixture properties considered •

