Abstract

Fracture properties and fatigue cracking resistance of asphalt binders

Research Team:

Arash Motamed, Graduate Student/Teaching Assistant
The University of Texas at Austin, Department of Civil, Architectural, and Environmental Engineering
aramtm@gmail.com

Dr. Amit Bhasin, Assistant Professor
The University of Texas at Austin, Department of Civil, Architectural, and Environmental Engineering
a-bhasin@mail.utexas.edu

Poster Presented by: Arash Motamed

Abstract:

Several different types of modifiers are increasingly being used to improve the performance of asphalt binders or to achieve desired mixture production characteristics (e.g., Warm Mix Asphalt). However, current Superpave performance specifications do not accurately reflect the performance characteristics of these modified binders. The main objective of this study was to evaluate the inherent fatigue cracking resistance of asphalt binders in the form of a matrix with rigid particle inclusions. The underlying rationale for this approach was to subject the binders to a state of stress that is similar to the one in a full asphalt mixture. This was achieved by fabricating and testing composite specimens of the asphalt binders and glass beads with a specified gradation. Four asphalt binders with similar true temperature grades but different modifiers were used in this study. The viscoelastic and fatigue cracking characteristics of the binders were measured using the glass bead-binder composite specimens in a dynamic shear rheometer at an intermediate temperature. The results demonstrate that the four asphalt binders modified using different methods had different damage characteristics despite the fact that these four binders were rated to have a similar performance grade based on the Superpave specifications. Fatigue cracking characteristics of the glass bead-binder test specimens used in this study were qualitatively very similar to the fatigue cracking characteristics of full asphalt mixtures using the same binders. The rank order of fatigue cracking resistance for the four glass bead-binder mixtures compared reasonably well to the rank order of fatigue cracking resistance for the full asphalt mixtures that incorporated these asphalt binders.