A Literature Review of Fracture Experiments on Asphalt Mixtures

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ABSTRACT

1) Motivation: Low temperature cracking is the dominant distress of asphalt pavements in cold regions. Currently, there are no agreed experiments to investigate the fracture resistance of asphalt materials. The objective of this research is to perform a literature review of current fracture experiments on asphalt mixtures. The description for each test were discussed in accordance with specimen geometries.

2) Approach: Four major tests, i.e. Indirect Tension Test (IDT), Single Edge Notch Bending (SENB) test, Semi-Circular Bending (SCB) test and Disk-shaped Compact Tension (DCT) test were described for their testing approaches and application ranges.

3) Findings: Due to the complex stress states in real conditions, cracks can induce tensile, in-plane shear, out-of-plane shear failures or mixed tensile and shear failures. However, little effort has been devoted to study the influence of out-of-plane shear failure. The author proposed an idea to study the mixed tensile and out-of-plane shear failure of asphalt mixtures using helix notch cylindrical specimen under torsion. Fractured specimens made from Portland cement concrete were presented.

ACKNOWLEDGMENTS

This research was supported by the start-up funding from the University of Vermont. We gratefully acknowledge help from fellows in Oak Ridge for providing specimens. The conclusions and interpretation of these data are solely those of the authors.

CONCLUSIONS

• Prior work has been devoted to study the mode I, mode II and mixed mode I/II fracture of asphalt mixtures. But little effort has focused on the effect of mode III fracture.
• The helix notch cylindrical specimen provides a unique opportunity to study the effect of mode III fracture of asphalt mixtures with rotating symmetry.

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