FATIGUE AND DYNAMIC TESTING OF BITUMINOUS MIXTURES

AMERICAN SOCIETY FOR TESTING AND MATERIALS
FATIGUE AND DYNAMIC TESTING OF BITUMINOUS MIXTURES


ASTM SPECIAL TECHNICAL PUBLICATION 561
V. P. Puzinauskas, symposium chairman

List price $15.50
04-561000-08

AMERICAN SOCIETY FOR TESTING AND MATERIALS
1916 Race Street, Philadelphia, Pa. 19103
NOTE

The Society is not responsible, as a body, for the statements and opinions advanced in this publication.
Foreword

The symposium on Fatigue and Dynamic Testing of Bituminous Mixtures was presented at the Seventy-sixth Annual Meeting of the American Society for Testing and Materials held in Philadelphia, Pa., 24-29 June 1973. Committee D-4 on Road and Paving Materials sponsored the symposium. V. P. Puzinauskas, The Asphalt Institute, presided as symposium chairman.
Related
ASTM Publications

Fatigue of Compacted Bituminous Aggregate Mixtures,
STP 508 (1972), $13.75 (04-508000-08)

Viscosity Testing of Asphalt and Experience with
Viscosity Graded Specifications, STP 532 (1973),
$8.75 (04-532000-08)
Contents

Introduction

Statistical Characteristics of Fatigue Damage Accumulation
   in Flexible Pavements—J. E. SOUSSOU and F. MOAVENZADEH 3
      Probabilistic Methods 4
      Closed Form Probabilistic Solution 4
      Numerical Application 8
      Summary and Conclusions 10

Influence of Laboratory Test Results for
   Asphaltic Concrete—L. H. IRWIN and B. M. GALLAWAY 12
      Equipment and Procedures 18
      Discussion 35
      Conclusions and Recommendations 40

Techniques for Characterizing Bituminous Materials Using a
   Versatile Triaxial Testing System—R. L. TERREL,
      I. S. AWAD, and L. R. FOSS 47
      Triaxial Test System 48
      Material 54
      Tests—Procedure and Results 56
      Concluding Remarks 65

Summary of Complex Modulus Laboratory Test Procedures
   and Results—M. W. WITCZAK and R. E. ROOT 67
      Effect of Test Variables 70
      Variability of the Dynamic Modulus Test 75
      Relationship Between Dynamic Modulus and Flexural
         Stiffness Tests 87
      Recommendations and Conclusions 90

Dynamic Response and Fatigue Characteristics of Asphaltic
   Mixtures—C. L. SARAF and KAMRAN MAJIDZADEH 95
      Materials and Testing Procedures 97
      Analysis of Results 103
      Summary and Conclusions 113
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dynamic Testing of Bituminous Mixtures for Permanent Deformation</td>
<td>115</td>
</tr>
<tr>
<td>Design Approaches for Prediction of Permanent Deformation</td>
<td>116</td>
</tr>
<tr>
<td>Equipment Operational Requirements</td>
<td>117</td>
</tr>
<tr>
<td>Description of Apparatus and Test Methods</td>
<td>119</td>
</tr>
<tr>
<td>Conclusions</td>
<td>129</td>
</tr>
<tr>
<td>Material Characterizations for Rational Pavement Design</td>
<td>132</td>
</tr>
<tr>
<td>Variability of Material Properties</td>
<td>134</td>
</tr>
<tr>
<td>Suggested Laboratory Method for Estimating Compliance Variation</td>
<td>136</td>
</tr>
<tr>
<td>Limitations and Use of the VESYS II Program</td>
<td>144</td>
</tr>
<tr>
<td>Summary</td>
<td>146</td>
</tr>
<tr>
<td></td>
<td>150</td>
</tr>
</tbody>
</table>