ISAP 2014 SUNDAY WORKSHOP (W2)

Comprehensive Fatigue Cracking Assessment through the Viscoelastic Continuum Damage Model

Workshop Description

Continuum damage theory (CDT) was first developed in the 1950's as a means to explore the probabilistic cohesive degradation of a mechanical body. The theory was found to be quite powerful and was further refined and improved upon during the 1960's and 1970's by many parallel international research efforts. These development efforts eventually led Dr. Richard Schapery to develop a work potential based damage theory to explain the way solid rocket fuels behaved under tensile loading. Solid rocket fuels share some important characteristics with hot-mix asphalt (HMA)—they are both semisolid, visco-elastic materials that are sensitive to both loading time and temperature. Because of this similarity, work potential theory became the foundation for a class of modern HMA continuum damage models collectively referred to as Viscoelastic Continuum Damage (VECD) models. Much of the developmental work in the last 20 years has been carried out at North Carolina State University through a collection of multiple, independent research efforts. While the primary use of these models is in the prediction of fatigue cracking, the generality of such approaches has led to developments with respect to modelling the aging, healing, and moisture damage characteristics of asphalt materials. Additional developments have extended the power of this material model by incorporating it into a structural response and analysis algorithm. This enhancement is critically important in the case of fatigue since the interaction between material and structure is paramount in determining fatigue performance

This workshop sets out to discuss the theory, development, and application of VECD models to understand the fatigue performance of asphalt concrete and asphalt concrete pavements. The workshop goal is to abridge the collection of literature on this topic and provide attendees with the current state of the art and applications of these models.

Organizers

Prof. Y. Richard Kim, North Carolina State University
Prof. Shane Underwood, Arizona State University

Time Period

1 pm – 5 pm, Sunday, June 1, 2014