WORKSHOP 2 : 10:30 – 12:45 AM JUNE 8, 2016

« New approaches to address pavement failure more realistically in asphaltic pavement design methods »

Chair: Jorge Soares, Universidade Federal do Ceara (Fortaleza, Brazil)
& **Co-chair:** Michael Wistuba, TU Braunschweig (Germany)

Jorge B. SOARES, Full-Professor, has a Ph.D. in Civil Engineering from Texas A&M University, 1997. He is currently the Director of Innovation of the State Agency for Research and Innovation Support in Ceará, a former Transportation Engineering Graduate Program Coordinator, Department Head and Associate Dean for Research at the College of Engineering of Universidade Federal do Ceará, Brazil. He has acted in consulting projects in pavement engineering including federal and interstate highways and airports, is a member of the Brazilian Asphalt Committee, in which has acted as the President in 2013. He has presided several Organizing Committees of important Scientific Events such as recently the RMPD Board of Editors Meeting and ISAP Workshop on Road Materials and Pavement Design. He is the co-editor of the Journal TRANSPORTES in Brazil.

Michael P. WISTUBA is full Professor for Road Engineering in the Department of Architecture, Civil Engineering and Environmental Sciences at Technische Universität Braunschweig, Germany. His research interests are the fundamental mechanisms that control behavior and durability of asphalt materials and pavement systems, the technical testing to address performance properties, the composition of asphalt mixtures, the design of highway and airport pavements, and the development of road management concepts to achieve durability. He is steering group member of the European Asphalt Technology Association (EATA), member of the German Road and Transportation Research Association (FGSV) and scientific board member of the Swiss Expert Association for Road and Transport Engineering (VSS).

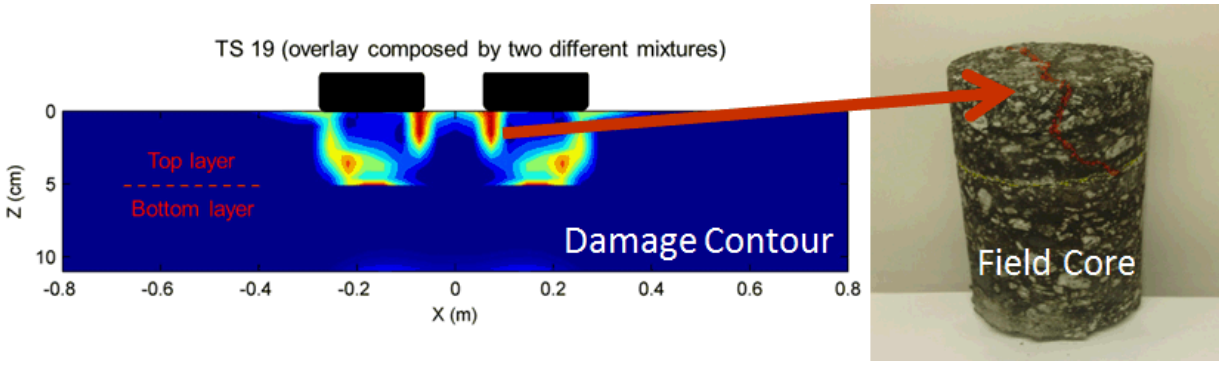
Workshop Abstract : Cracking is a pavement failure addressed in all major mechanistic-empirical design methods around the globe. Different countries have distinct approaches for the problem. Connecting laboratory and field observations is an important aspect to be considered. As more sophisticated experiments and models emerge from the scientific literature, it is important to perceive how the state of the art is related to the state of practice when it comes to cracking considerations. This Workshop intends to promote a discussion about different approaches to address pavement failure, primarily cracking, in design methods. Experts from different countries will present recent developments, and the idea is to help producing a moment for discussion and insights that can add to both academia and practice.

8TH RILEM INTERNATIONAL CONFERENCE ON MECHANISMS OF CRACKING AND DEBONDING IN PAVEMENTS
June 7-9, 2016 – Nantes, FRANCE

« Fatigue cracking within the new mechanistic-empirical pavement design method in Brazil »

Jorge SOARES

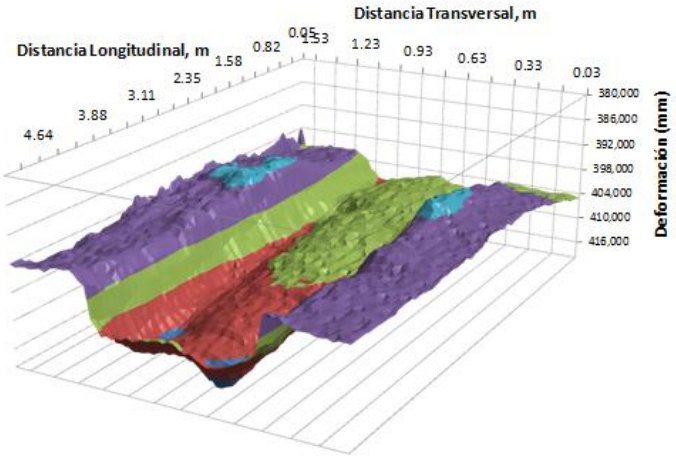
Abstract. This talk presents the work for implementation and validation of the viscoelastic continuum damage (VECD) model for asphalt mixture and pavement analysis in Brazil regarding fatigue damage. It is described the main steps of this nationwide research: (i) implementation of the simplified viscoelastic continuum damage (S-VECD) model in Brazil for asphalt mixture characterization, (ii) validation of the VECD model approach for pavement analysis based on field performance observations, and defining a simulated damage-to-cracked area transfer function for local pavement test sections in Rio de Janeiro, RJ, and (iii) validation and calibration of this local transfer function to be used throughout Brazil for asphalt pavement fatigue cracking predictions, based on field performance observations of the National MEPDG Project's pavement test sections, thereby validating the proposed framework's prediction capability. It is shown that the transfer function defined locally for Rio de Janeiro's pavement sections can be used for the fatigue performance predictions of a wide range of pavements all over Brazil, as the predicted and observed cracked areas for the National MEPDG Project's pavements presented very good agreement, following the same trends found for Rio de Janeiro's pavement sections. Based on the prediction errors determined for all 44 national pavement test sections, the proposed framework's prediction capability was determined so that reliability-based solutions can be applied for flexible pavement design. It is shown that the proposed computational framework has very good fatigue cracking prediction capability and how this promising approach has been used for asphalt pavements fatigue cracking analyses in Brazil.



« Recent Developments in Accelerated Pavement Testing (APT) as a Pavement Design Tool in Costa Rica »

Luis LORIA-SALAZAR obtained his PhD in Civil Engineering in 2011 at the University of Nevada, Reno. He is the General Director of the Transportation Infrastructure Program (PITRA) of the National Laboratory of Materials of the University of Costa Rica (LanammeUCR), where he has to coordinate the work of 6 departments and 120 people. He is member of the TRB committees, AFD40, accelerated pavement testing and AFK20, Bituminous materials and actually is the Chairman of the Heavy Vehicle Simulator International Alliance (HVSIA).

Abstract. Pavement design of in Costa Rica has been made using the AASHTO 93 design method, which is related to empirical correlations from results obtained several decades ago in the AASHO road test. In order to establish a more fundamental design method the National Laboratory of Materials and Structural Models of the University of Costa Rica (LanammeUCR) has implemented an Accelerated Pavement Testing (APT) program. In this case, a Heavy Vehicle Simulator (HVS) provides a first step in the validation/calibration process of transfer functions. The project involves characterization and engineering of improved materials, introduction of new technologies, improvement of existing specifications and the development of a pavement design guide specific for the country. Construction of the initial four test track sections was performed in May of 2012. These initial sections correspond to flexible and semi-rigid pavement structures and the experiment included: embedded instrumentation, non-destructive pavement evaluation and material characterization of all four test sections. The objective of this phase was to perform a structural comparison, in terms of thickness of the asphalt concrete layer and in terms of base material type (granular vs. cement treated). The effect of construction variability on pavement performance was a main concern for this study. Accelerated testing has finalized for one section. A description of the implemented APT program and results of the first experiment are also discussed in this document. Until now, the first stage of the experiment has been ended and performance data is under evaluation to develop initial performance models for asphalt concrete fatigue, permanent deformation for all the pavement layers, and roughness models.



« Pavement design : past, present, future, where is the crack ? »

Laurent POROT is senior scientist at Arizona chemical, The Netherlands. He has a civil engineer master from “Ecole Nationale des Ponts et Chaussées”, France. His focus is on pavement and materials engineering. Over years and projects he gained expertise especially in pavement design through various projects around the world, using empirical or fundamental method, as well advance Finite Element Model. He worked for road engineering and construction companies, amongst other with fellow developers of pavement design methods like G. Caroff for the French fundamental method or R. Koole with the Shell Pavement Design Method, SPDM. Now involved in pavement materials, his focus is looking at materials properties and characteristics that can ensure long-term road service performances.

Abstract. Pavement design aims to address the structural asset value of pavement whatever if it’s for standard traffic road, for heavy duty vehicles including harbors, for airplanes or for railways. So far it mostly based on fatigue life approach. However cracking is more than fatigue cracking and encompasses as well thermal cracking, reflective cracking, healing, debonding. With better material engineering, better understanding of underlying failure mechanism, how really pavement design can take into account the full range of cracking phenomenon. This presentation will provide a broad overview of different pavement design methods either empirical or fundamental approach. With the other presentations of the workshop, it will open the floor for a panel discussion on how cracking and debonding are really fully part of current practices. How better it can be integrated. The activities of the RILEM MCD on cracking and debonding is here foreseen as an important key stone that can help designers to optimise further pavement design for the future, towards more sustainable and afordable pavement for highways, harbors, airport or railways.