



A dissipated energy model for fatigue in asphalt material

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Cinzia Maggiore is a PhD student on the Marie Curie TEAM Initial Training Programme at the Nottingham Transportation Engineering Centre (NTEC), Department of Civil Engineering at the University of Nottingham. In May 2010, she joined the Training in European Asset Management (TEAM) Project as PhD student. The aim of the project is to improve understanding of fatigue damage and healing in asphalt materials using dissipated energy approaches. During her PhD, an exchange with IFSTTAR in Nantes and with Palermo is already planned.

The paper that will be presented in the conference presents the main topic of her project: flexural fatigue and healing in asphalt material, one of the main failure modes in asphalt pavement structures. Good prediction of the fatigue life of pavements will help to develop and improve pavement design procedures.

This paper discusses the development of a fatigue model, including healing effects, to better understand fatigue behaviour, based on the dissipated energy approach in asphalt. Not all of the dissipated energy is responsible for material damage; researchers have demonstrated that viscoelastic and heating effects are also included in the dissipated energy.

This paper carries out a critical analysis of fatigue and healing approaches, paying particular attention to the dissipated energy models for asphalt materials developed so far, evaluating the change of stiffness, phase angle and dissipated energy.

Different laboratory equipment such as tension-compression at University of Nottingham, 2 Point Bending tests in IFSTTAR in Nantes and 4 Point Bending tests at University of Palermo, have been used to undertake fatigue tests under different loading and environmental conditions in order to obtain the parameters necessary to create the fatigue model and validate it. The effects of healing were also included in the model, by considering rest periods during a fatigue test.