Preface

Special Issue on “Time-dependent behaviour of bituminous materials”

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Bituminous materials, being one of the largest components of road and airport pavements, are subjected to various loading time-histories due to irregular traffic (i.e. rate of loading, loading time, rest period) under extremely variable climatic conditions (i.e. temperature, aging, moisture).

Increasing mobility demand and consequent need for infrastructure maintenance and rehabilitation are leading to a challenging use of innovative high-performance materials for bituminous pavements, at the same time taking care of environmental concerns in search of more sustainable infrastructures.

Bituminous materials are complex multi-phase bodies and, as such, thermo-viscoelasticity and fracture mechanics can be successfully adopted at nano-, micro- and meso-scale, in order to find a rational approach for their appropriate and reliable application within the pavement network.

This Special Issue, including a collection of papers written by leading experts in the field, is aimed at contributing to an improved understanding of the time-dependent mechanical response of bituminous materials in pavement engineering. The main topics include bituminous binders' rheology as well as the time–temperature dependent behaviour of asphalt mixtures and pavement systems. Three papers investigate the influence of additives and nano-modifiers on the viscoelastic response of bituminous binders. Among the contributions related to asphalt mixtures, three papers adopt the Representative Volume Element (RVE) concept to predict viscoelastic properties, whereas other papers focus on damage and anisotropic behaviour. The time–temperature dependency of pavement systems is also analysed considering macro-scale artificial healing and characterising the shear failure of bituminous interfaces.

Although many advances have been achieved, there are still as many open issues to be investigated, and for this reason the hope is that this Special Issue will raise questions rather than give answers so as to foster a both passionate and fruitful involvement from researchers.

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