Mechanistic Evaluation of Asphalt Paving Materials and Structures

Road transportation is a basic necessity for commerce, travel, and daily life. In most countries, the asphalt pavement network is one of the largest civil infrastructure investments; however, the conditions of these pavement networks require significant and continued attention. In addition, the materials and technologies used for asphalt paving have become increasingly complex and now include warm mix asphalts, reclaimed asphalt pavement, and recycled asphalt shingles, to name a few. Despite the level of investment and technological advances in materials and pavement designs, the sometimes lack of satisfactory performance outcomes has encouraged the asphalt paving industry and highway agencies to shift from empirically-based specifications and design methods to more mechanistic ones. The benefits of mechanistic design and analysis methods compared to empirically-based methods include that they provide: 1) a better understanding of the mechanisms that determine the performance of asphalt materials and pavements, 2) more reliable and accurate test methods and models, 3) the ability to design better performing materials, 4) the ability to develop customized materials and structures to meet specific project conditions, 5) improved pavement network performance, and 6) cost savings due to the longer life of pavements and less maintenance. The purpose of this special issue is to present a compilation of state-of-the-art research into the mechanistic modeling of asphalt materials and pavements. This issue includes articles that introduce and discuss advanced pavement technologies that have been developed in different countries.