

Abstract

This paper presents the main results of a numerical investigation on the three-dimensional (3-D) strain analysis of flexible pavement structures using a coupled Finite Element-Mapped Infinite Element (FE-MIE) model. The validation and numerical performance of this model are assessed by confronting critical pavement responses with Burmister's solution and FEM simulation results for multi-layered elastic structures. The coupled model is then efficiently utilised to perform 3-D simulations of a typical flexible pavement structure in order to investigate the impact of two tire configurations (conventional dual and new generation wide-base tires) on critical pavement response parameters. The numerical results obtained show the effectiveness and the accuracy of the coupled FE-MIE model. In addition, the simulation results indicate that, compared with conventional dual tire assembly, single wide base tire caused slightly greater fatigue asphalt cracking and subgrade rutting potentials and can thus be utilised in view of its potential to provide numerous mechanical, economic and environmental benefits