EFFECT OF INTERLAYER BONDING ON PAVEMENT RESPONSE UNDER DYNAMIC LOAD IN PRESENCE OF ASPHALT CONCRETE CROSS-ANISOTROPY

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ABSTRACT
In this study, the effects of various interlayer bonding conditions on pavement strain behavior is evaluated considering dynamic loads, cross-anisotropy of Asphalt Concrete (AC), and pavement temperatures. A dynamic Finite Element Model (FEM) of an instrumented asphalt pavement section is developed in ABAQUS and cross-anisotropy of the AC layer is defined by the ratio of horizontal to vertical modulus (*n*-value). Field AC cores and granular aggregate base and subbase materials were collected during construction. Laboratory tests were conducted to determine the *n*-value and viscoelastic parameters of the AC. In addition, the resilient modulus test was conducted to determine the stress-dependency of the base and subbase course materials. These values and parameters are used as FEM model inputs through User-defined Material (UMAT) interface in the ABAQUS. For validation, model simulation was run Falling Weight Deflectometer (FWD) loading and model outputs were matched with FWD deflections. The validated model is further simulated by varying friction coefficient at the interface of two layers such as AC-AC, Base-Subbase, and Subbase-Subgrade respectively. The result shows that the variation in friction coefficient along the AC-AC layer interface affects the horizontal tensile strain at bottom of the AC layer higher compared to the other layer interfaces. The similar trend is observed in case of vertical strains in both AC and base layers. Effect of the AC-AC interlayer friction on strains during the summer is greater than that during the winter.