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16. Abstract

A finite-element program has been developed to model the response of rigid pavement to both static loads and temperature changes. The program is fully three-dimensional and incorporates not only the common twenty-node brick element but also a thin interface element and a three-node beam element. The interface element is used in the pavement–soil interface and in the joints between slabs. The dowel bars in the joints are modeled by the beam element, which includes flexural and shear deformations. Stresses, strains, and displacements are computed for body forces, traffic loads, and temperature changes individually so that the program can be used to obtain either total stresses for design, or strain changes to compare with experimental data.

The effects of varying the material properties in the pavement, base, subgrade, interfaces, and dowels are investigated to identify those parameters which most influence the solution. Results of various interface thicknesses and dowel diameters also are presented. A further study is conducted to determine the effect of average pavement temperature on the curling stresses and displacements. Finally, results from the program are compared with experimental curling displacements and stresses.

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