

Non-Linear Behavior of Granular Materials in Pavement Design

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Abstract : The design of flexible pavements is currently carried out using a multilayer elastic theory. However, for thin-surface pavements subject to light or medium traffic volumes, the importance of the non-linear stress-strain behavior of unbound granular materials requires the use of more sophisticated numerical models for the structural design of these pavements. The simplified analysis of the nonlinear behavior of granular materials in pavement design will be developed in this study. To achieve this objective, an equivalent linear model derived from a volumetric shear stress model is used to simulate the nonlinear elastic behavior of two unlinked local granular materials often used in pavements. This model is included here to adequately incorporate material non-linearity due to stress dependence and stiffness of the granular layers in the flexible pavement analysis. The sensitivity of the pavement design criteria to the likely variations in asphalt layer thickness and the mineralogical nature of unbound granular materials commonly used in pavement structures are also evaluated.

Keywords : granular materials, linear equivalent model, non-linear behavior, pavement design, shear volumetric strain model

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