Static and dynamic triaxial tests on sulphur-asphalt-sand mixes

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Abstract

This thesis reports on the behavior of sulphur-asphalt-sand (SAS) mixes under repeated loading to help generate useful laboratory data that can depict the performance of such mixes under trafficked conditions and ascertain the role that sulphur plays in a sand-asphalt pavement system.

Sttic and repeated load triaxial compression tests were carried out on laboratory prepared SAS samples of different sulphur/asphalt ratios and binder contents, under a range of applied deviator stress and at different tst temperatures. The analysis of the repeated load results has permitted the use of a simple hyperbolic expression that relates vertical permanent strain to applied deviator stress.

The contribution of SAS base course layer to permanent deformation at the surface is evaluated by integrating the vertical permanent strain with depth and assuming that pavements are layered elastic systems. A computer program based on elastic multi-layer theory was used to determine elastic stresses in the pavement system under a selected wheel load arrangement.

Based on the laboratory results, it appears that sulphur contributes positively to the performance of such mixes in terms of increased strength and reduced rutting tendencies. Thus more use can be made of sand-asphalt mixes as road bases when sulphur is added to them. This is particularly meaningful in areas where wind blown sands are abundantly available.