

AXI-SYMMETRIC MULTI-LAYERED ELASTIC ANALYSIS CONSIDERING CROSS ANISOTROPY OF GRANULAR BASE

Yoshiaki OZAWA, James MAINA and Kunihito MATSUI

Summary

It is important for a method of pavement analysis to be able to take into account stress dependency or cross anisotropic behavior of pavement layers made-up from granular materials. Bearing this in mind, it is important to pay attention to research works by Lekhnitskii, Gerrard and Harrison, and Wang et. al. In this research, body forces were ignored and by assuming axi-symmetric cylindrical coordinates, equilibrium equations in the form of Navier equations were obtained. Furthermore, Hankel transform of solutions for axi-symmetric model of a multi-layered system comprising cross-anisotropy layer were derived and example problem analyzed. The example problem was a three-layer system where the first and third layers are isotropic, while the second layer is cross anisotropy. Moreover, the level of cross anisotropy for the second layer was varied and analysis performed. Observations based on results of surface deflections, strains and normal stress within the pavement structure indicated the following: (1) The influence of cross anisotropic material behavior on the surface deflections is evident near the point of loading and there is no effect far from the point of loading, and (2) If elastic modulus in vertical direction is bigger than elastic modulus in horizontal direction, there appears to be good load dispersion and hence smaller stress level in lower layers.

