ABSTRACT

India is a developing nation with large population. Demand for mobility and economical considerations press for judicious selection of pavement type. Granular pavement with thin asphalt topping (as non-structural layer for waterproofing purpose) can be an economical pavement design alternative. In addition to the selection of material and type of pavement, knowledge of its behavior under traffic is equally important to utilize the structure at its best. It is found that pavements may cease to deteriorate under certain conditions termed as shakedown condition. In the present work, lower bound shakedown limit for shakedown condition is obtained for Drucker Prager yield criterion under plane strain condition. The results are compared with Von Mises, Tresca and Mohr Coulomb yield criteria. Probabilistic analysis using Monte Carlo simulation is carried out to obtain distribution of shakedown limit. Failure probability of pavement is calculated considering variation in both the shakedown limit of the pavement and pressure distribution due to traffic loading. A case study has been solved using data from literature.

Keywords: Shakedown analysis, Granular pavement, Yield criteria, Monte Carlo simulation.