

## Abstract

This work deals with the analysis of stresses in concrete pavements by considering the concrete pavement as a thin plate resting on a " Winkler type " soil medium . The finite element procedure is used to model the concrete pavement and the soil using software " ANSYS " .

The concrete slab is discretized using plate elements which have the capability for modeling an elastic foundation , soil , by incorporating the modulus of subgrade reaction . The concrete slab is loaded by wheel load at three critical positions in concrete pavement these positions are the Edge , Interior , and Corner , these positions are the critical positions considered by Westergaard in his analysis .

Concrete slabs of the same properties for different thickness values and for different values of the modulus of subgrade reaction are loaded by wheel load to find the maximum deflection and maximum tensile stress , which are compared with maximum deflection and maximum tensile stress from the theoretical analysis of Westergaard for verification .

The maximum tensile stresses from the finite element analysis are used to find unified expressions for different thicknesses and moduli of subgrade reaction for concrete slabs of the same properties in the three critical positions .

The effect of three parameters : Size of load area , Aspect ratio of load area , and Location to load distance , is investigated , and a relationship is given for each of the parameters .

All these studies show that the given unified expressions and the relations of parameters can be used to find the maximum tensile stresses for different size and aspect ratio of the loading area and for different location to load distances for the three critical positions mentioned above with an acceptable accuracy.