

**THERMAL STRESSES OF FLEXIBLE PAVEMENT WITH
CONSIDERATION OF TEMPERATURE-DEPENDENT
MATERIAL CHARACTERISTICS USING STIFFNESS MATRIX
METHOD**

Zhong Yang, Wu Yu-Hong*

Department of Civil Engineering Dalian University of Technology P.R.China

* Zhongyang58@163.net

ABSTRACT

The asphalt pavement is regarded as a multilayered elastic half space axisymmetrical body. By introducing the relationship between material characteristics and temperature into the fundamental equations of thermoelasticity and using mathematic methods of Laplace and Hankel integral transformation, the stiffness matrix for a layer is derived firstly. Then the global stiffness matrix is established for multilayered elastic half space using the finite element concepts in which layers are completely contacted. Therefore, explicit solution for thermal stresses of the asphalt pavement is obtained from the solution of the algebra equation formed by global stiffness matrix and the inverse Hankel and Laplace integral transformation. Because the elements of matrix do not include positive exponential function, the calculation is not overflowed. Therefore, the shortages of transfer matrix method are overcome. This approach serves as a better model for real pavement structure as it takes into account the relationships between the material characteristics and temperature in the pavement system.

KEY WORDS: Asphalt pavement, thermal stresses, stiffness matrix method, integral transformation, temperature-dependent material characteristics.