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Response of Pavement under Temperature and Vehicle Coupled Loading

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Abstract : To study the dynamic mechanics response of asphalt pavement under the temperature load and vehicle loading, asphalt pavement was regarded as multilayered elastic half-space system, and theory analysis was conducted by regarding dynamic modulus of asphalt mixture as the parameter. Firstly, based on the dynamic modulus test of asphalt mixture, function relationship between the dynamic modulus of representative asphalt mixture and temperature was obtained. In addition, the analytical solution for thermal stress in the single layer was derived by using Laplace integral transformation and Hankel integral transformation respectively by using thermal equations of equilibrium. The analytical solution of calculation model of thermal stress in asphalt pavement was derived by transfer matrix of thermal stress in multilayer elastic system. Finally, the variation of thermal stress in pavement structure was analyzed. The result shows that there is an obvious difference between the thermal stress based on dynamic modulus and the solution based on static modulus. Therefore, the dynamic change of parameter in asphalt mixture should be taken into consideration when the theoretical analysis is taken out.

Keywords : asphalt pavement, dynamic modulus, integral transformation, transfer matrix, thermal stress
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