

## Viscoelastic Modeling of Hot Mix Asphalt (HMA) under Repeated Loading by Using Finite Element Method

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**Abstract :** Predicting the hot mix asphalt (HMA) response and performance is a challenging task because of the subjectivity of HMA under the complex loading and environmental condition. The behavior of HMA is a function of temperature of loading and also shows the time and rate-dependent behavior directly affecting design criteria of mixture. Velocity of load passing make the time and rate. The viscoelasticity illustrates the reaction of HMA under loading and environmental conditions such as temperature and moisture effect. The behavior has direct effect on design criteria such as tensional strain and vertical deflection. In this paper, the computational framework for viscoelasticity and implementation in 3D dimensional HMA model is introduced to use in finite element method. The model was lied under various repeated loading conditions at constant temperature. The response of HMA viscoelastic behavior is investigated in loading condition under speed vehicle and sensitivity of behavior to the range of speed and compared to HMA which is supposed to have elastic behavior as in conventional design methods. The results show the importance of loading time pulse, unloading time and various speeds on design criteria. Also the importance of memory fading of material to storing the strain and stress due to repeated loading was shown. The model was simulated by ABAQUS finite element package

**Keywords :** viscoelasticity, finite element method, repeated loading, HMA

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